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The Port of Baltimore-Containers and Railroads: A Necessary Interaction

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THE PORT OF BALTIMORE, CONTAINERS AND RAILROADS

A NECESSARY INTERACTION

MAJOR PAPER AS FINAL REQUIREMENT

FOR

MASTER OF MARINE AFFAIRS

Submitted to Bruce Marti

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INTRODUCTION

This paper came about as a synthesis of interests in ships, railroads and history. Perhaps no other port on the East Coast has such a strong blend of these three forces as the Port of Baltimore. This paper is about the interaction of railroads and the port and how this interaction continues to play a major role in the Port of Baltimore's development. The original hypothesis assumed that Baltimore's strong history with the railroads made her a railroad port. But hard times and competitive truck rates have driven the railroads out of Baltimore to such an extent that rail service in the Port of Baltimore may not be able to handle projected container (and coal) traffic. In this paper, the above hypothesis was put to the test of available facts and interviews to see if indeed the Port of Baltimore was losing a valuable service. The author's conclusion is that the railroads are leaving the Port and that the rail infrastructure may not be capable of handling future demands for container traffic.

This paper is an observation and investigation of a situation that currently is affecting the Port of Baltimore. The data presented is the most current and accurate that the author could find. Any omissions or inaccuracies were made unconsciously and corrections will be gratefully acknowledged.

The Port of Baltimore, since its beginning as a gateway for interior commerce in 1706, has been affected by changes in American transportation through every stage in its development. The Port of Baltimore actually began twenty-three years before the City of Baltimore was incorporated. In fact, the ports of Annapolis and Oxford were strong rival ports until the hinterland and harbor in Baltimore developed. Despite some early manufacturing in the inner harbor area, Baltimore was, until the 1950s and 60s, primarily a bulk shipping port. In 1758, the first shipments of grain left for Europe from the mudflats of the inner harbor. Due to its large tobacco exports, the port was not blockaded in the Revolutionary War. During the Second World War, the port was the source of all coal for the Marshall Plan in Europe.

In 1827, the B&O Railroad laid the first tracks to the port and began an extensive linkage with the Midwest hinterlands that remains today with three major railroads in the port.[1] The Post Civil War era was the real beginning of Baltimore as a port for international cargo. The expanding hinterlands were ready for the railroads to rebuild their once extensive connections ruined in the war. Three main railroads played a major part in developing the Port of Baltimore. They were the Baltimore and Ohio, the Pennsylvania (now Conrail) and the Western Maryland. These railroads built and maintained most of the early port facilities and gave the railroads an extremely heavy hand in port development.

> These terminals . . . were designed to accommodate the surge of passengers and cargos from overseas and to carry imports back inland. Huge by the standards of their day, they made Baltimore a "railroad port" with its policies and growth determined in large measure by the owners of these major facilities.[2]

The railroads' growth peaked just after the turn of the century and during the First World War they were nationalized in 1917. Following World War II, Baltimore began to see that her port was going to have to expand to handle any future cargo needs.

In 1956, the Maryland Port Authority was created by the state assembly and in 1971 was changed to the Maryland Port Administration (MPA).

The Maryland Port Authority was formed "to assist and encourage the extension and improvement of privately operated port facilities." The legislature empowered the "Authority" and later the "Administration" to manage the port's facilities as efficiently as possible.

> . . . if private facilities are inadequate or inadequately operated at any time, to construct and, if necessary, to operate supplementary public facilities deemed by it to be required in the public interest.

Under the Maryland Port "Administration" (MPA), the port became one of seven sections of the Department of Transportation, although still carrying most of the powers voted to it in 1956. The success of the MPA is shown in the port's dramatic climb to the top as the second largest container facility on the East and Gulf Coasts. During this chage, the port became

public oriented rather than run by private cartels.

> Put quite simply, the port during this period has been transformed from a decaying, railroad dominated collection of outdated piers into a modern shipper-oriented port with not only a new look but new identity as well.[4]

Seven years after the Maryland Port Authority began, the first containers were moving across the Atlantic to Northern Europe. The first shipment began in April 1963. Since that time, containers have assumed a major section of the general cargo market and have revolutionized concepts of cargo movement, especially as regards the inland section. While truck movements have claimed 80% of all inland container traffic in Baltimore, one would be foolish to assume this trend can continue, especially with rising fuel costs. A second development that might begin to shape Baltimore's market impact is the new use of mini- (and micro-) bridge through rates. While the early impacts show minor deviation of container traffic, this was during a period of heavy Interstate Commerce Commission (ICC) regulation. Recently, the ICC has deregulated the rates for container movements on railroads (TOFC and COFC). By doing this,the distance advantage of Baltimore can become more effective. But is Baltimore ready for this impact?

In examining the container impact, one cannot overlook the hinterland development of the general cargo area. Baltimore's hinterland is constantly changing as new ports make new services available. The West Coast is now a competitor for the Midwestern container markets. Competitively Baltimore is

holding her own with the four major ports in the North Atlantic Range (New York, Philadelphia, Baltimore, Norfolk-Hampton Roads). The MPA has stated that while bulk cargos will be welcomed to the port, the main thrust of development by the MPA will be in the area of new general cargo.

> In facility programming efforts, it should be emphasized that the Maryland Port Administration has concentrated on fostering the general cargo trade of the Port of Baltimore. Hence, its role as a builder and operator of general cargo facilities has been one of steady growth. A review shows that in 1962, the MPA handled 8 percent of the general cargo of the Port through its very modest facilities. By 1975, the percentages approached 70 percent. This is a formidable record, especially when one considers that the general cargo trade has grown from 4,070,000 short tons in 1962 to some 7,820,000 short tons in the record year, 1974.[5]

For this reason, the paper will concentrate on the container/railroad impact. A final section will briefly look at the coal development in Baltimore and the extremely heavy demand on rail services that are forecast for as early as 1983. While the railroads have come and withdrawn with the growth of trucking, the port cannot overlook the past and potential future ties with the railroad.

A few definitions follow to clarify concepts used in later discussions.

The container (and containerization) is a method of shipping many smaller and irregular packages inside a larger metal or fiberglass package. This package is a standardized shape and size so that it will fit in any ship's hold, either container or general cargo so designed to carry containers. The

container will also fit onto trucks or railroad cars built for this standard size package. Generally, the size of the container varies only in length, either twenty, forty, or sixty feet with width and height constant. Most container traffic figures are given in TEU's or twenty foot equivalent units so that a forty-foot container is two TEUs. As mentioned earlier, there are two basic modes of railroad transportation of containers. The first is Container on Flat Car (COFC) and the second is Trailer on Flat Car (TOFC) whereby the trailer with wheels is put on the flat car and shipped to a terminal and then routed the final distance. This second method is also called Piggyback Service.

An outgrowth of this technology is a container movement called "landbridge" or "minibridge," depending on the origin of the movement. In landbridge the container(s) would be coming from Europe and moving to Japan (or vice versa). See Appendix A. The containers would use the rail system of the U.S. rather than the Panama Canal to move the containers to their final destination. This saves roughly five to nine days of transit time. The minibridge system is merely landbridge without one of the water legs. In this instance, a container going from London to Los Angeles would take the water journey to New York or Baltimore and then be placed in a unit train for Los Angeles. A unit train is simply a train carrying a homogenous cargo for a specific destination. This cuts out delay en route switching or terminal work. This also removes the need for a trip through the Panama Canal.

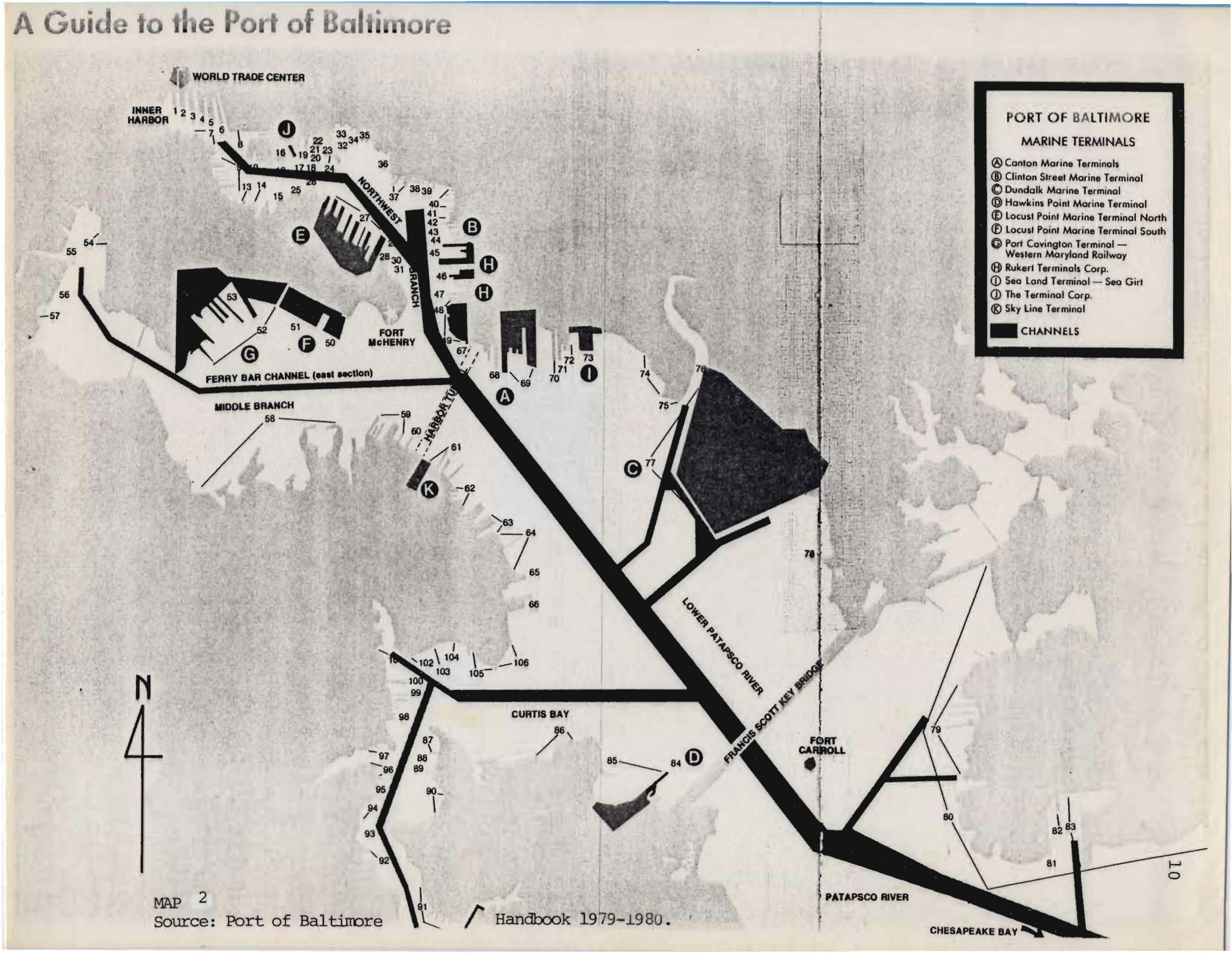
II. THE PORT OF BALTIMORE

The Port of Baltimore is located on the Patapsco River, a tributary of the Upper Chesapeake Bay. The Bay itself is the largest estuary in the United States, covering 4,400 square miles. Located just above Cape Hatteras, it can be reached by two different entrances. The first is through the Virginia Capes (Cape Henry and Cape Charles) 150 miles south from Baltimore. From the north, one can enter via the Delaware River and the Chesapeake and Delaware (C&D) Canal, reaching Baltimore after a 125 mile transit. Channel depths are a major concern for Baltimore which has been trying since 1969 to get permission to dredge the main channel to the Capes to 50 feet. As of this writing, the project has been approved but no dredging has begun. The C&D Canal is also up for dredging as the 35-foot limit makes the larger container vessels return down the Chesapeake to head north.

As far as inland transportation is concerned, Baltimore is located almost exactly between New York and Norfolk, Virginia, each being 200 miles on either side of the port. Baltimore is also 100 to 200 miles closer to the Midwest industrial markets. (Please refer to MAP 1.) This is perhaps the port's strongest selling point, as will be discussed later.

Physically, the port has 45 miles of waterfront which surround 1600 acres of sheltered harbor area. At least 60

A Guide to the Port of Baltimore



MAP 2

Source: Port of Baltimore Handbook 1979-1980.

percent of the waterfront is given to terminals and marine related industry. (Please refer to Map 2.) Seven percent is used by former water dependent industries that no longer need the access.[7] There are 90 open and covered cargo piers. Of these 64 are public general cargo piers and 18 are bulk cargo piers (privately owned) which shows Baltimore's commitment to general cargo development.[8] One interesting phenomenon is the almost constant ratio of bulk to general cargo over the last 10 years. In Table 1, it can be seen that even with the large increase in container traffic, the bulk cargos still remain roughly 85 percent of the port's cargo. The port is served by over 100 steamship companies visiting 300 countries with roughly 335 sailings per week.[9] Baltimore has traditionally been a bulk port but is constantly trying to balance the general bulk cargos so that fluctuations in certain bulk markets (e.g. grain) do not affect the port's general overall health.

Present day figures for port traffic will show the relative size of Baltimore's port and facilities. The port handles roughly 4,000 ships per year. In 1980, there were 4,012 visiting ships; while 1979 had 4,214. Total tonnage was 38,169,000 tons, down a bit from 1979. Containers remained strong with 4.6 million tons passing through the port and 3.6 million being handled at the major container terminal at Dundalk. Containers comprised 62 percent of all general cargo which is one of the highest percentages for any world port. Export tonnage was up to 22 million tons versus 18.2 million in 1979.

TABLE 2

Baltimore's Portion of the Foreign Trade Tonnage Moving Through All Ports of the United States and Those in the North Atlantic Range

Calendar Years 1970-1980
(Net Tons)

Export Commerce

Year	Total United States Ports	Total North Atlantic Ports	Port of Baltimore	% Of Total U.S.	% Of Total N. A.
1970	240,932,054	72,657,000	9,385,078	3.9	12.9
1971	205,174,500	53,482,500	6,475,718	3.2	12.1
1972	231.401,500	56.194.000	8.176,337	3.5	14.6
1973	275,788,500	62,394,000	10,321,690	3.7	16.5
1974	266,531,150	73,981,500	12,876,241	4.8	17.4
1975	270,876,500	71,957,000	13,868,820	5.1	19.3
1976	284,686,000	69,801,500	14,944,604	5.2	21.4
1977	275,811,000	58,065,000	14,039,561	5.1	24.2
1978	301,573,000	51,575,000	14,339,178	4.8	27.8
1979	359,329,300	77,629,000	18,189,946	5.1	23.4
1980	403,326,000	100,700,500	21,665,077	5.4	21.5

Import Commerce

1970	321,647,290	186,159,500	22,005,844	6.8	11.8
1971	337,035,000	185,203,000	20,720,370	6.1	11.2
1972	374,909,500	203,462,500	20,999,309	5.6	10.3
1973	461,101,000	240,627,500	24,250,277	5.3	10.1
1974	468,348,500	223,762,500	28,110,360	6.0	12.6
1975	451,122,500	196,107,000	22,372,273	5.0	11.4
1976	538,171,000	198,225,500	19,651,223	3.7	9.9
1977	626,264,000	202,309,000	16,368,524	2.6	8.1
1978	601,653,000	189,564,500	19,184,697	3.2	10.1
1979	603,829,000	183,995,000	20,338,570	3.4	11.1
1980	495,376,500	151,329,500	15,221,799	3.1	10.1

Total Foreign Commerce

1970	562,579,344	258,816,500	31,390,922	5.6	12.1
1971	542,209,500	238,685,500	27,196,088	5.0	11.4
1972	606,311,000	259,656,500	29,175,646	4.8	11.2
1973	736.889.500	303,021,500	34,571,967	4.7	11.4
1974	734,879,650	297,744,000	40,986,601	5.6	13.8
1975	721,999,000	268,064,000	36,241,093	5.0	13.5
1976	822,857,000	268,027,000	34,595,827	4.2	12.9
1977	902,075,000	260,374,000	30,408,085	3.4	11.7
1978	903,226,000	241,139,500	33,523,875	3.7	13.9
1979	963,158,300	261,624,000	38,528,516	4.0	14.7
1980	898,702,500	252,030,000	36,896,876	4.1	14.6

Source: Foreign Commerce Statistical Report (1979)
Maryland Department of Transportation

Imports dropped to 16.1 million from 20.3 million in 1979, a drop of 21 percent. (See Table 2.) Nevertheless, Baltimore rated sixth in tonnage and third in value of total foreign waterborne commerce in the U.S.

By examining the figures in Table 3, the proximity of Baltimore to her inland markets is quickly seen. While certain rates for cargo movements to the North Atlantic Range (NAR) ports have been equalized, the majority of container and bulk coal rates are distance sensitive. It should be mentioned that while rates are a large factor in shipper preferences, there are other factors that can affect his decision. Some of these are frequency of service, port facilities, and labor productivity.[10] The distance factor is translated directly into savings with the smaller piggyback service (1-3 containers). This service is from ramp to ramp only and is the major part of container movements at this time. In Table 4, one can see the savings are substantial on a TOFC/COFC movement between say Baltimore and East St. Louis, a major container consolidation point. The savings on two containers shipped together is $225 per movement. Add to this the port fees in New York for labor-wage guarantees and the difference is substantial. Recently (March 23, 1981), the ICC deregulated the TOFC/COFC rail rates in the U.S. As of April 8, 1981, the rates had dropped $126. Again, this will favor Baltimore as shippers can now charge for the distance involved. One final note on the distance to the industrial hinterland concerns the 24 hour delivery radius for railroads and trucks from

TABLE 3

Comparative Rail Distances

TO: / FROM:	Baltimore Miles	Baltimore Km.	Philadelphia Miles	Philadelphia Km.	New York Miles	New York Km.	Norfolk Miles	Norfolk Km.
Pittsburgh	313	503	360	579	436	701	515	812
Cleveland	444	714	490	788	562	904	636	1023
Columbus	479	770	545	877	621	999	632	1017
Cincinnati	360	901	644	1036	724	1165	656	1055
Detroit	604	972	637	1025	631	1015	796	1281
Indianapolis	650	1046	723	1163	799	1286	766	1232
Chicago	767	1234	814	1310	890	1432	914	1471
Milwaukee	831	1337	878	1413	881	1417	999	1607
St. Louis	891	1434	958	1541	1040	1673	990	1593

Comparative Truck Distances

TO: / FROM:	Baltimore Miles	Baltimore Km.	Philadelphia Miles	Philadelphia Km.	New York Miles	New York Km.	Norfolk Miles	Norfolk Km.
Pittsburgh	218	350	289	465	373	600	390	627
Cleveland	344	553	415	667	481	774	517	832
Columbus	393	632	464	746	548	882	548	882
Cincinnati	496	798	567	912	651	1047	613	986
Detroit	501	806	572	920	644	1036	674	1084
Indianapolis	564	907	635	1022	719	1157	710	1142
Chicago	668	1075	739	1189	811	1305	840	1352
Milwaukee	758	1220	829	1334	901	1450	930	1496
St. Louis	798	1284	869	1398	953	1533	927	1492

SOURCE: Port of Baltimore Handbook 1979-80, Maryland Department of Transportation.

TABLE 4

Plan II½ Container Rates

Plan II½ rates apply to a ramp-to-ramp service and involve the use of railroad equipment. These rates also apply to steamship line containers when the railroad and the steamship line have a working Equipment Interchange Agreement.

Between:		Charges (2 Trailers) 80,000 lbs. Excess		Charges (1 Trailer) 40,000 lbs. Excess		Advantages Using Baltimore 80,000 lbs. - 40,000 lbs.	
		Col. 1 $	Col. 2 Cwt.	Col. 3 $	Col. 4 Cwt.	Col. 5 $	Col. 6 $
Baltimore	Chicago, IL	1208	1.72	760	2.08		
New York	"	1362	1.94	854	2.29	154	94
Norfolk	"	1476	1.94	911	2.30	268	151
Phila.	"	1249	1.80	784	2.18	41	24
Baltimore	Cincinnati, OH	918	1.33	576	1.62		
New York	"	1117	1.62	703	1.94	199	127
Norfolk	"	1106	1.49	683	1.72	188	107
Phila.	"	1002	1.41	632	1.72	84	56
Baltimore	E.St. Louis,IL	1346	1.90	849	2.32		
New York	"	1571	2.22	986	2.72	225	137
Norfolk	"	1575	2.10	984	2.57	229	135
Phila.	"	1446	2.05	914	2.54	100	65
Baltimore	Indpls, IN	1012	1.41	634	1.73		
New York	"	1234	1.73	772	2.10	222	138
Norfolk	"	1297	1.71	801	2.05	285	167
Phila.	"	1117	1.62	703	1.94	105	69
Baltimore	Louisville, KY	1042	1.47	652	1.81		
New York	"	1286	1.87	807	2.22	244	155
Norfolk	"	1242	1.62	764	1.98	200	112
Phila.	"	1168	1.67	736	2.01	126	84

TABLE 4 (Continued)

Between:		$	Cwt.	$	Cwt.	$	$
Baltimore	Peoria, IL	1419	1.89	877	2.23		
New York	"	1602	2.10	1001	2.62	183	124
Norfolk	"	1459	2.08	921	2.57	40	44
Phila.	"	1496	1.99	926	2.43	77	49

Note: Columns 1,3,5,6 in dollars per unit - Columns 2,4 in cents per hundred. Freight charges include Ex Parte 375 Effective April 1, 1980.

Railroads serving the Port of Baltimore are the Chessie System (B&)), Consolidated Rail Corp. (Conrail) and the Western Maryland (WM), part of the Chessie System, via Interline Service with the Norfolk & Western (N&W).

The availability of volume rates applying on three twenty foot containers, ten or more containers, and annual volume contract rates further enhance your transportation flexibility and economic advantages by shipping through the Port of Baltimore.

SOURCE: Traffic Reporter, Maryland Port Administration, May, 1980.

Baltimore. Via rail, general cargo can reach 43.7 percent of the U.S. industrial market or 36.6 percent of the U.S. population. Via truck, the cargo could find 37.1 percent of the U.S. industrial market and 31.4 percent of the U.S. population.[11] Needless to say, with the energy "crisis" and transportation costs rising, the Port of Baltimore must surely look better and better to interior shippers and markets.

When one looks at the port, the surrounding city, and the state, the socioeconomic impact is enormous. The Port of Baltimore, beyond the taxes it pays, generates one out of every ten jobs in Maryland and $1 out of every $9.89 earned in the state.[12] Table 5 shows the individual impacts of the different port activities. Some general figures show that each automobile generates roughly $74.64 in economic activity. Each container generates $257.00 and each ton of bulk cargo generates $11.79, including direct and indirect impacts. From these figures and tonnage figures for the port, one can easily see why a reduction in cargo movements in Baltimore or any port is a serious problem; be it loss of jobs or shipper confidence in the port's ability to attract carriers.

A more detailed breakdown of container traffic is found in Table 6 which shows which variables were used to find the economic impact per container, per acre, and per ton of cargo. On the same table the impact per ton of container is shown for truck versus railroad (6A). This figure will change as more and more bulk cargo (coal) moves through the port on unit trains. The third part (6B) of the same table shows the

TABLE 5

Total Induced and Direct Impacts and Final Impacts per Ton, Port of Baltimore, 1973

Port-Related Activities	Direct Impacts: General Cargo ($000)	Direct Impacts: All Bulk Cargoes ($000)	Estimated Multiplier*	Total Direct and Induced Impacts: General Cargo ($000)	Total Direct and Induced Impacts: All bulk Cargoes ($000)	Total Direct and Induced Impacts: All Cargoes ($000)
Vessel Disbursements Services	12,645	6,085	1.78	22,508	10,831	33,339
Government Requirements	801	640	1.85	1,482	1.184	2,666
Loading, discharging	83,984	7,397	1.71	143,613	12,649	156,262
Supplies	2,878	4,409	1.78	5,123	7,848	12,971
Bunkering	14,296	5,793	0.85	12,152	4,924	17,076
Crew Expenditures	3,732	1,405	2.01	7,501	2,824	10,325
Surface Transportation	44,300	163,473	1.78	78,854	290,982	369,836
Insurance & Banking	4,400	3,140	1.85	8,140	5,809	13,949
Port Services	18,710	53,730	1.71	31,994	91,878	123,872
TOTALS ($000)	185,746	246,072		311,367	428,929	740,296
Tonnages (000)	5,569	37,980		5,569	37,980	43,849

Source: The Economic Impact of the Port of Baltimore on Maryland; University of Maryland, April-1975.

TABLE 6

Total Direct Impacts, Container Traffic,
Port of Baltimore, 1973

	Total Impact ($000)	Impact Per Ton* ($/ton)	Impact per Container** ($/unit)
Vessel disbursements	17,273	5.96	70.92
Crew Expenditures	445	0.15	1.79
Port Services	29,690	10.24	121.86
Surface transportation	13,080	4.51	53.67
Insurance and Banking	2,291	0.79	9.40
TOTAL	$62,779	$21.65	$257.64

Average alloted to containers at Dundalk Marine Terminal in 1973: 101
Impact per acre: $621,570

*Total container tonnage, 1973: 2,900,000
**Average weight per container, 1973: 11.9 tons

TABLE 6A

Surface Transportation Impact, Container Traffic
Port of Baltimore, 1973

	Impact ($ millions)	Tonnage (millions)	Impact per Ton ($/ton)
Railroad Carriage	$4.97	1.4	$3.55
Truck Carriage	8.11	1.5	5.41
All Modes	13.08	2.9	4.51

TABLE 6B

Railroad Impact By Category of Traffic,
Port of Baltimore, 1973

Category	Railroad Impact ($000)	Railroad Tonnage (000)	Impact Per Ton ($/ton)
General Cargo	16,258	3,803	4.28
Bulk Transshipped	25,346	10,055	2.52

Source: The Economic Impact of the Port of Baltimore on Maryland; University of Maryland, April - 1975.

difference in general cargo versus bulk cargo in the railroad's impact on the port. The more intensive labor handling of general cargo brings the larger impact. It should be noted that in 1973 only 40 percent of all general cargo was containerized. It is also interesting to note that the railroad had a smaller impact than the trucking industry for the same amount of container traffic. This perhaps could be said to show the economies of scale in rail movements.

In the area of foreign trade flows, some interesting trends have developed recently. For the first time in over ten years, the import of foreign commerce has lagged behind the export.[13] This was due to drops in petroleum imports and iron ore for steel production. Add to this the large coal export increase, and the role of the port as an export collector. Baltimore's increasing role as a major port of commerce is shown in Table 7 which shows that Baltimore's total foreign commerce has been increasing steadily, both in percent of total U.S. and percent of North Atlantic ports. Baltimore's share of the North Atlantic port's total tonnage has been increasing while Philadelphia's and New York's have been dropping. It is only because of import cutbacks that Baltimore did not have a record year for 1980. General cargo has been increasing steadily since 1970 due primarily to container movements through the port and the aggressive general cargo market building by the Port of Baltimore.

The major trading countries for the Port of Baltimore are shown in Tables 8 and 9. These show that the major trade

TABLE 7

Relative Size of North Atlantic Ports
Number of Vessels and Total Tonnage per Port as Percent of Total N.A. Ports

	1975		1976		1977		1978		1979	
	No. V/L's	Tonnage (1000's)								
Total U.S.	102,460	718,355	107,549	805,472	110,316	869,889	102,793	903,170	105,930	994,882
Total N.A.P.'s	24,352	230,734	23,728	263,128	21,626	226,874	19,137	225,226	19,104	238,028
% of total U.S.		32.0%		32.7%		26.1%		24.9%		23.9%
New York	7,465	71,784	7,170	74,101	6,773	74,723	6,702	74,356	6,288	67,348
% of N.A.P.		30.8%		28.1%		32.9%		32.9%		28.3%
Philadelphia	2,068	29,175	1,648	24,719	1,502	26,381	1,555	28,658	1,462	28,423
% of N.A.P.		12.6%		9.4%		11.6%		12.7%		11.9%
Baltimore	2,606	26,019	2,437	25,147	2,243	23,771	2,512	28,177	2,435	32,689
% of N.A.P.		11.3%		9.5%		10.4%		12.5%		13.7%
Norfolk	2,312	31,599	2,424	33,618	2,058	29,392	1,729	21,576	2,238	32,429
% of N.A.P.		13.5%		12.7%		12.8%		9.5%		13.6%

Tons shown are net tons of 100 cubic feet carrying capacity of vessels and do not represent the actual weight of cargo carried.

SOURCE: U.S. Department of Commerce. U.S. Foreign Trade 1975-1979 Annual Reports.

TABLE 8

Distribution of Export Cargo Shipped from the Port of Baltimore
Arranged by Principal Countries of Destination
in order of Tonnage

1980

Country of Destination	Short Tons	Country of Destination	Value
Japan	4,465,876	Saudi Arabia	838,989,449
France	2,171,503	Japan	609,694,060
Belgium and Luxemborg	1,608,504	West Germany	559,807,835
Spain	1,512,201	United Kingdom	524,360,792
United Kingdom	1,117,393	Belgium and Luxemborg	518,085,102
Italy	920,638	France	437,087,184
Netherlands	836,067	Spain	398,017,051
West Germany	798,793	Italy	353,764,986
Rumania	750,199	Netherlands	330,273,793
Greece	750,199	Republic of South Africa	326,743,999

Export By Trade Areas

TRADE AREA	SHORT TONS		VALUE	
	1980	1979	1980	1979
Europe	13,494,552	10,730,848	4,167,691,812	3,743,484,305
Asia	6,100,677	5,830,227	2,934,801,638	2,379,503,201
South America	763,357	908,484	923,607,742	751,552,659
Africa	1,072,490	544,456	840,412,190	450,472,731
North America	186,344	125,828	85,273,110	47,873,212
Australia and Oceania	28,557	27,861	91,713,883	75,932,063
Unidentified Trade Areas	19,101	22,242	-	114,831

Source: Foreign Commerce Statistical Report (1979)
Maryland Department of Transportation

TABLE 9

Import Trade of the Port of Baltimore Arranged by Principal Countries of Origin in order of Tonnage

1980

Country of Origin	Short Tons	Country of Origin	Value
Canada	4,912,185	Japan	1,535,204,457
Venezuela	3,050,152	West Germany	987,177,197
Algeria	966,558	United Kingdom	358,281,385
Brazil	809,596	France	281,718,593
Netherlands Antilles	682,060	Venequela	290,824,345
Japan	549,754	Italy	277,495,090
Australia	502,699	Brazil	243,340,890
Trinidad and Tobago	290,207	Norway	182,302,702
West Germany	271,824	Canada	161,640,607
Republic of South Africa	240,601	Sweden	129,293,926

Import By Trade Areas

TRADE AREA	SHORT TONS		VALUE	
	1980	1979	1980	1979
North America	6,505,418	7,957,475	462,197,594	373,055,244
South America	4,423,455	4,688,126	653,058,782	510,585,857
Europe	1,275,826	1,837,893	2,747,616,504	2,589,667,759
Africa	1,432,216	4,416,985	253,026,022	240,860,942
Asia	1,060,640	1,025,536	2,019,101,751	1,509,550,931
Australia and Oceania	524,244	412,555	110,382,262	90,252,874

Source: Foreign Commerce Statistical Report (1979)
Maryland Department of Transportation

areas for export are Europe and East Asia. Baltimore maintains Europe as her major partner while, in general, the U.S. - Far East trade has surpassed the European trade, especially in the container market. An interesting note is how technology can change the value of exports. Saudi Arabia is nineteenth on the export tonnage list but number one on the export value list. As far as imports are concerned, the tonnage leader is Canada with the metallic ores, while Japan leads the value category with autos and electronics. Again the European flow has been suffering while the Asian and Australian trade flows have been growing at a phenomenal rate, even with declining imports. Another interesting statistic is the decline of African import tonnage by 3 million tons and the increase in total value by 5 percent despite a decrease in tonnage.

These basic facts show that Baltimore is growing in a geographical area that is generally losing cargo to other coasts. Containerized general cargo is growing despite the import slowdown. However, there are a few danger signals on the horizon as far as the rail/port interface is concerned. In the next section, we will deal with this growing problem of crosscountry movements and the enormous switch to truck transport.

III. CONTAINER MOVEMENTS

In this section, the container portion of Baltimore's general cargo movements will be examined. By looking at the large growth in container traffic and the changing container hinterland, the importance of the container traffic to the Port of Baltimore will be shown. Following this, there will be a discussion of the truck versus the rail inland transportation problem. Trucking handles 82 percent of all containers moving through the Port of Baltimore. In this paper, almost all container statistics come from the Dundalk Marine Terminal. While the terminal does not handle all the port's containers, it handles over 60 percent of the traffic and compiles the most comprehensive records available. In the first full year of operation, the terminal handled 68,071 containers, but by 1980 the terminal handled 245,977, an increase of 261.4 percent.

Some interesting trends in Dundalk's container business are the import/export imbalances. (See Table 10.) Exports have always exceeded imports in tonnage and loaded containers moved. This varies from the total cargo tonnage pattern for the port which favored imports over exports until 1980. Another interesting statistical flow is the amount of empty containers returning to Baltimore as inbound containers. This a margin of three or four to one over empty export containers. On the export

TABLE 10

Dundalk Container Statistics
1971 Through 1980

	1971	1972	1973	1974	1975
IMPORT					
Empty Containers	5,693	14,736	21,629	17,517	29,769
Loaded Containers	78,123	38,126	58,753	66,929	64,170
Cargo Tonnage	386,696	511,866	779,396	971,163	884,636
EXPORT					
Empty Containers	2,946	4,056	6,335	7,185	9,429
Loaded Containers	31,309	49,167	76,946	82,380	92,958
Cargo Tonnage	490,597	714,289	1,130,617	1,256,905	1,390,570
TOTAL IMPORT/EXPORT					
Empty Containers	8,639	18,792	27,964	24,702	39,198
Loaded Containers	59,432	87,293	135,699	149,309	157,128
Cargo Tonnage	877,293	1,226,155	1,910,013	2,228,068	2,275,206
Vessels	473	709	909	986	1,073
Total Containers	68,071	106,085	163,662	176,011	196,326
Total Tonnage	877,293	1,226,155	1,910,013	2,228,068	2,275,206
Avg. Tonnage Per Loaded Container	14.8	14.0	14.1	15.0	14.5

	1976	1977	1978	1979	1980
IMPORT					
Empty Containers	30,080	26,819	33,689	32,113	46,908
Loaded Containers	67,764	65,946	85,416	83,724	70,351
Cargo Tonnage	953,421	957,725	1,255,975	1,211,499	990,786
EXPORT					
Empty Containers	11,059	9,370	11,227	9,526	5,016
Loaded Containers	91,238	86,273	114,994	118,102	123,702
Cargo Tonnage	1,412,517	1,333,216	1,721,126	1,757,358	1,856,335
TOTAL IMPORT/EXPORT					
Empty Containers	41,139	36,189	44,916	41,639	51,924
Loaded Containers	159,012	152,219	200,410	201,826	194,053
Cargo Tonnage	2,365,938	2,290,941	2,947,101	2,968,857	2,847,121
Vessels	1,147	1,104	1,401	1,230	1,216
Total Containers	200,151	188,408	245,326	243,465	245,977
Total Tonnage	2,365,938	2,290,941	2,947,101	2,968,857	2,847,121
Avg. Tonnage Per Loaded Container	14.9	15.1	14.7	14.7	14.7

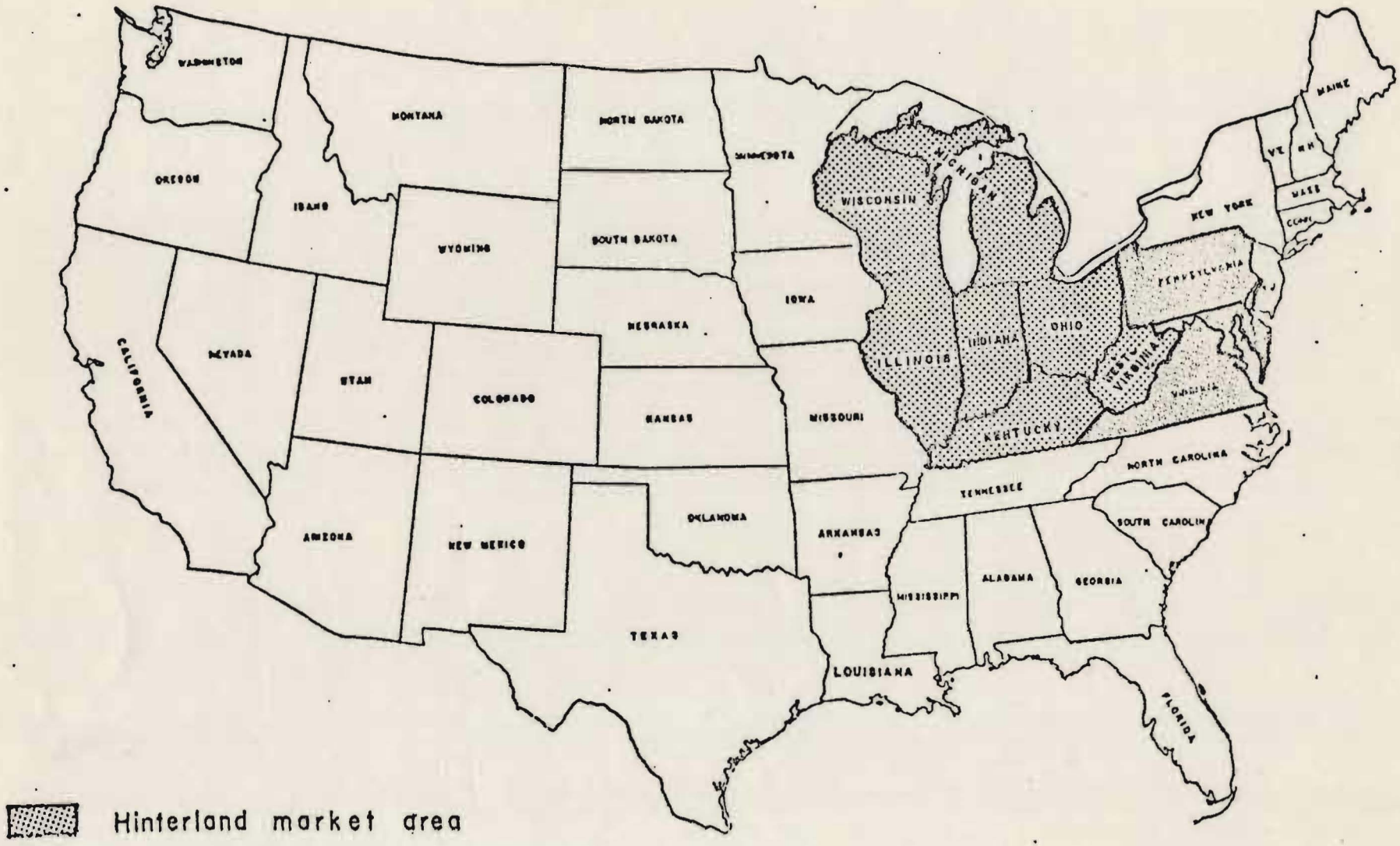
Source: Dundalk Marine Terminal

side of container movements, loaded containers were far ahead of empties by a margin of twenty to one in 1980. Yet in the import flow, the loaded containers were less than twice the number of empty containers. The fact that Dundalk Terminal exported 128,718 containers and imported only 117,259 containers in the same year means that Dundalk must be supplied by another port or the containers are being transshipped in Baltimore from another terminal. This transportation of intra-port containers brings problems and extra cost.

The hinterlands for the import/export markets are as important as the number of containers moving through the port. These hinterlands determine which manufacturing areas the port can draw on in attempting to increase its traffic. As the distance from a port grows, the attraction of other ports becomes stronger. Within a one-hundred mile radius, Baltimore has a population concentration of 9.2 million people, New York has 26.2 million and Hampton Roads has 4.3.[14] Hence, one can see the relative advantages each port has in reaching large local markets. The commodity being shipped, the fact that it's an import or export, even the time of year, all make a large difference in the areas that a port considers a true hinterland. Figure 1 shows two hinterlands, one inside the other. The local hinterland is basically Maryland, Delaware, Pennsylvania, and Virginia. The local market area is the area that has the heaviest impacts upon the port. The hinterland area is affected by the distance factor away from Baltimore and the rates involved. As one moves toward Chicago, the

PORT OF BALTIMORE GENERAL CARGO MARKET AREAS

FIGURE 1



SOURCE: A Market Profile of the Port of Baltimore: 1970 and '76 (Published 1980)

Gulf and South Atlantic ports become more competitive with Baltimore. This will be discussed in relation to the following figures 2 and 3.

In the following container markets discussion, the local and hinterland markets, as seen in Figure 1, will be the area that will be dealt with in regard to comparing the different states and traffic flows. Because the numbers for individual container flows were not available for imports at this writing, the tonnage per state was used in the import comparisons. As shown in Table 12 (export container movements), the tonnage figures generally follow the container movements within reasonable limits. In the export container market figures, we see a developing bias toward local market predominance. From the Patton study, we see that in 1955 the Midwest market held an even balance with the local market. Both were roughly 45 percent. However by 1980, the markets had diverged and the local market now controls 59.6 percent of the container movements. The Midwest market only influeces 31.2 percent. This could be due to the emergence of the truck as the major container carrier on the inland legs.

In container imports (Table 13), the Midwest market has traditionally lagged behind the local market. In 1955, the percents were 34.2 percent for the Midwest versus 52.7 percent local, or roughly an 18 percent difference. In 1976, the Midwest market was 29.1 percent and the local market was 44.8 percent, roughly a 16 percent difference. So again we

TABLE 12

EXPORT CARGO FLOWS - PORT OF BALTIMORE

	1955		1976							1980**			
State	Carloads	% of Total	Tonnage	(Containers)	% of Total	% of Total	% State Expts Through Baltimore	% Exports* Carried Rail	Truck	Containers	% of Total	% Export Carried Rail	Truck
Illinois(ILL)	86	2.9	54,055	(4,719)	6.8	(8)	19	84	9	5,075	7	57	44
Indiana (IN)	122	4.0	20,569	(1,936)	2.6	(3)	17	51	49	2,316	3	59	41
Kentucky(KY)	38	1.3	21,105	(1,021)	2.6	(2)	20	82	18	1,783	2	66	34
(MI)	113	3.8	40,756	(2,264)	5.2	(4)	24	52	41	3,206	4	43	57
(OH)	771	25.8	89,935	(6,850)	11.4	(11)	39	70	30	8,106	11	32	68
(WV)	189	6.3	19,723	(1,704)	2.5	(3)	56	41	59	2,402	3	11	89
(WS)	49	1.6	38,507	(337)	4.9	(1)	26	91	9	576	1	31	69
TOTAL MIDWEST	1368	45.7	284,650	(18,831)	36.1	(32.2)		70	28	23,518	31.2	42	58
(MD)	479	16.0	262,570	(18,693)	33.3	(31)	90	6	89	23,249	31	8	92
(PA)	721	24.0	105,908	(12,206)	13.4	(20)	21	3	94	14,302	19	2	98
(VA)	99	3.3	31,621	(3,493)	4.0	(6)	13	-	100	6,488	9	1	99
(DL)	2	-	6,387	(564)	.8	(1)	31	-	100	658	1	-	-
(DC)	44	1.5	-	(121)	-	(-)	-	-	-	263	-	-	-
TOTAL LOCAL	1345	44.9	406,486	(35,077)	51.5	(60.0)	-	5	91	44,960	59.6	5	95
ALL OTHERS	281	9	98,079	(4,522)	12.4	(8)	-	10	1	6,993	9.0	9	91
OVERALL TOTAL	2994		789,215	(58,430)				32	62	75,471		18	82

*Percents will not total 100 as other modes were used.
**Statistics from Dundalk Marine Terminal through October only.

Note: 1) In 1979 total container movements for hinterland and local were 90,523 or 70.9% of POB's total export container movement (127,628).
2) 1955 Study uses carloads instead of containers
3) 1980 Figures are through October of 1980.

Source: 1) Maryland Port Administration, Department of Marketing and Statistics - Marketing Survey for POB-1980.
2) Patton article.

see the immediate hinterlands of Baltimore as being extremely important both as an export and import hinterland. One further interesting point is the growing "all others" category in the import range. A much larger hinterland has developed for the cargo from Baltimore. In 1955, this "all others" category was 12.2 percent, but by 1976 it had grown to 19.9 percent. Looking at the two maps (Figures 2 and 3) from the Patton article, one quickly sees the relative size of the import versus export hinterlands, the export being larger. This was primarily due to the large manufacturing shipments coming from the Iowa, Illinois, Wisconsin area, and the fact that the general cargo markets had generally favored exports (until 1970). In 1955, there were 1,147 carloads of import versus 2,994 carloads of export. Advancing to today's general cargo markets, one sees that exports outpaced imports in 1980. Strangely enough, general cargo imports were outpaced by general cargo exports in 1970, the last time until 1980. Containers have always maintained an export over import balance through every year of operation, right through 1980. (See Table 10.)

From a recent port survey (1976 figures) of the Baltimore market area, covering both the Midwest hinterland and the local market area, some interesting figures are available. (See Table 14.) In the total Port of Baltimore container market area, exports and imports were even. Imports in 1976 totalled 2,201,156 versus 2,147,260 for the export movements. Baltimore handled 32 percent of its total container hinterland's exports

TABLE 13

PORT OF BALTIMORE

Import Flows of Container Cargoes 1976 and 1955

	1976		1976 (1980)			1955	
State	Tonnage	% of Total	% State Impts Through Baltimore	% Tonnage Carried Rail	Truck	Carloads	% of Total
IL	36,440	5.9	7	49( )	51( )	26	2.3
IN	39,736	6.4	36	81( )	19( )	22	1.9
KY	22,287	3.6	24	62( )	38( )	6	.52
MI	35,510	5.7	11	41( )	59( )	78	6.8
OH	93,296	15.0	28	45( )	52( )	223	19.4
WV	13,165	2.1	73	18( )	82( )	34	2.9
WS	5,766	0.9	8	-( )	100( )	3	.26
TOTAL MIDWEST	246,200	39.6		50( )	49( )	392	34.2
MD	115,026	18.5	67	**( )	89( )	261	22.7
PA	83,146	13.4	18	3( )	80( )	275	23.9
VA	17,858	2.9	12	**( )	78( )	58	5.0
DL	10,733	1.7	42	-( )	100( )	5	.43
DC	24,945	4.0	81	-( )	100( )	16	1.4
TOTAL LOCAL	251,708	40.5		1( )	87( )	615	53.6
ALL OTHERS	123,691	19.9		37( )	63( )	140	12.2
OVERALL TOTAL	621,599			23( )	67( )	1147	

NOTE:-1) In 1979 the Total Tonnage for the hinterland and local markets was 80.1% of the POB's total import container traffic. 2) 1976 figures are container tonnage only. 3) 1955 is all general cargo through Baltimore by rail carload for the month of June only. June was selected as a representative month. There are no container figures for 1976 or 1980 in imports.

Note 2) 1980 figures are in the mail.

**Other modes involved.

This comparison is merely to show change in markets and traffic flows. It does not guarantee absolute accuracy in actual numbers, nor is it a comparison of boxcars to containers to general cargo. Whereas most general cargo in 1955 traveled by boxcar, today's general cargo generally travels by container.

Source: 1) Maryland Statewide Goods Movement Study. Pg. B-1(4/6).
2) Patton (see Footnotes).
3) Market Study (see Footnotes).

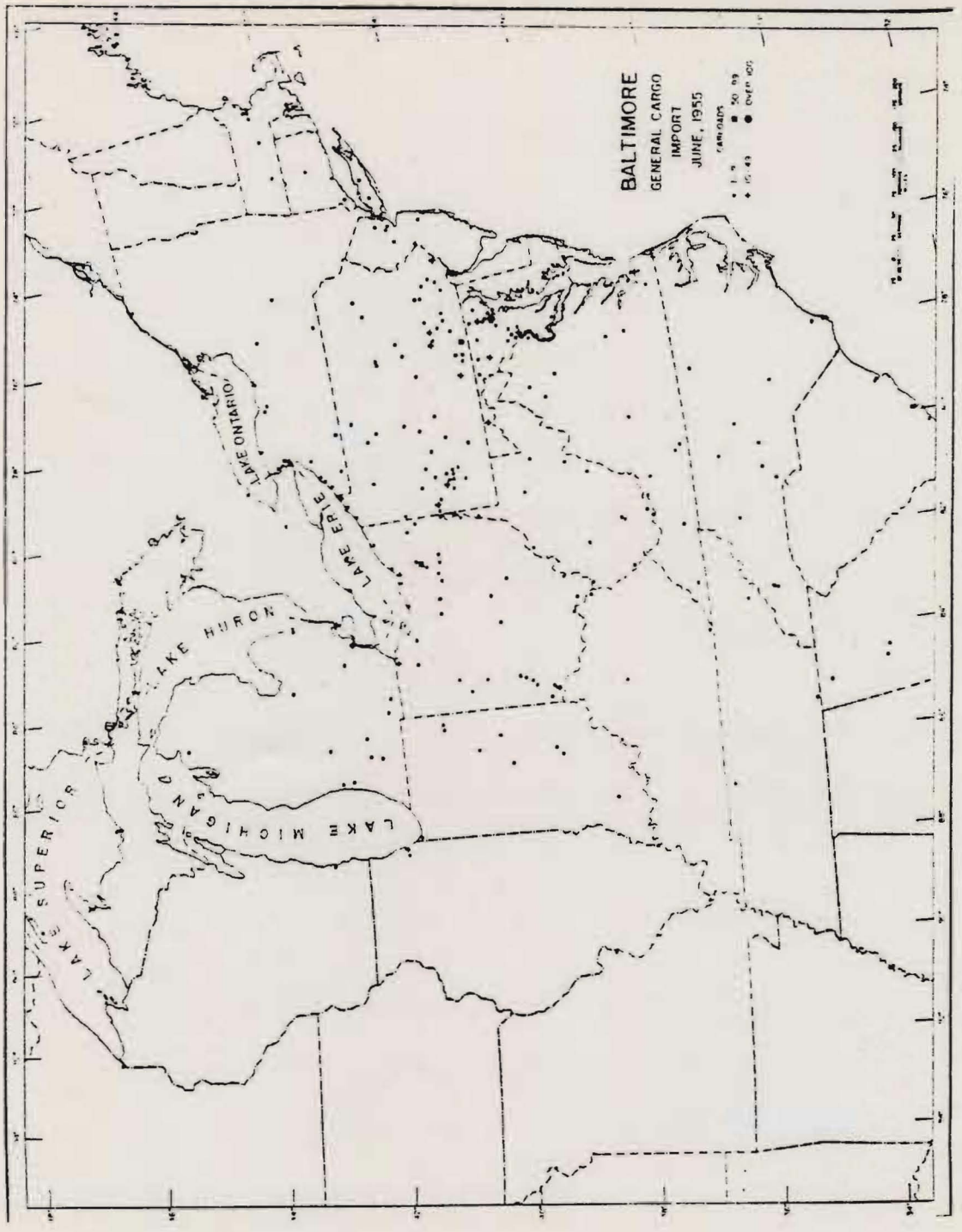


FIGURE 2

SOURCE: Patton

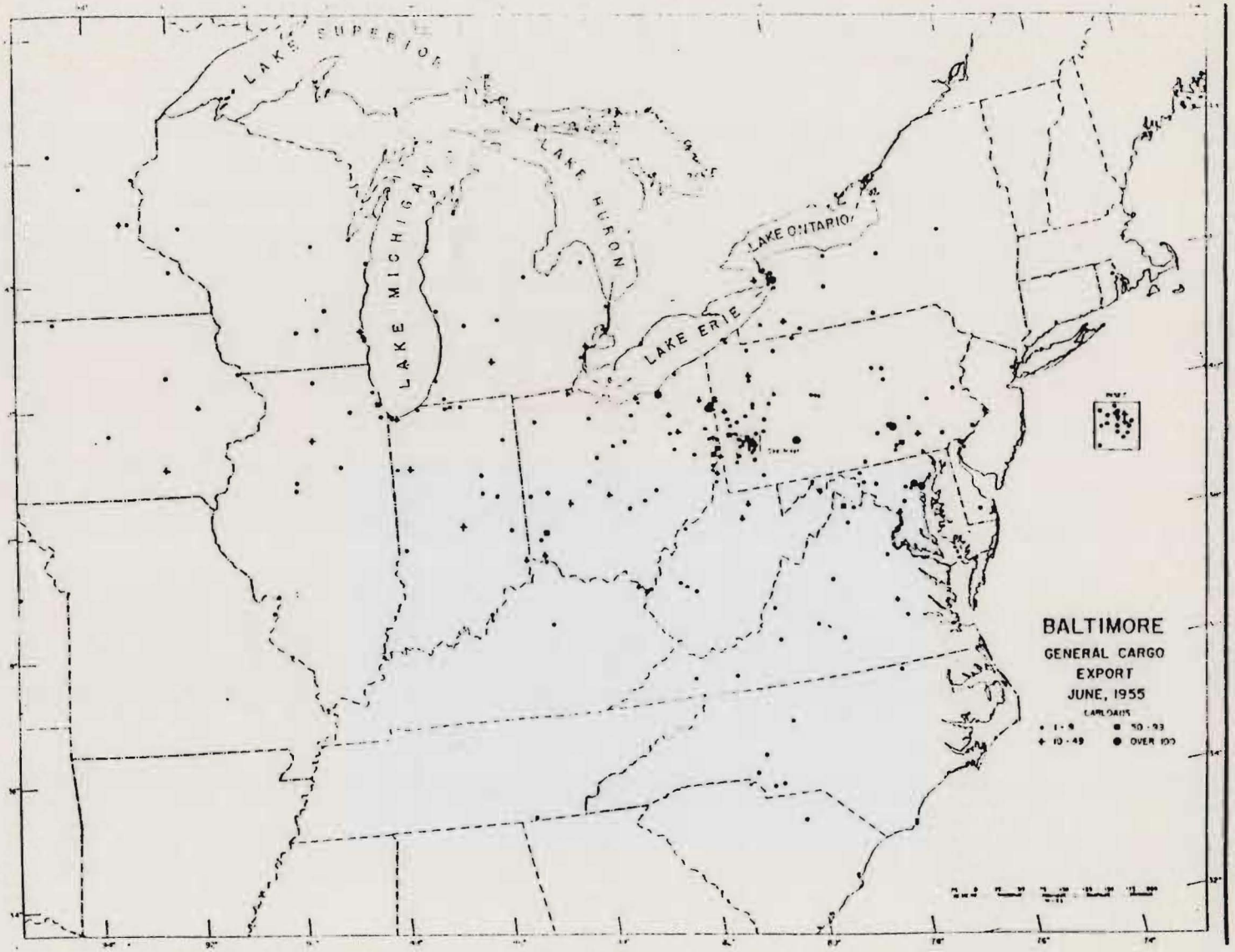


FIGURE 3

SOURCE: Patton

TABLE 14

Comparison of Baltimore and the Total Market Area for Container Movements

Total Import Containers for Port of Baltimore Total Market Area

	Tonnage	Percent	Port of Baltimore Tonnage	Port of Baltimore Percent
Local	832,165	37.8%	251,708	50.6%
Hinterland	1,368,991	62.2%	246,200	49.4%
TOTAL	2,201,156		497,908	

Baltimore handles 23% of her total hinterland imports.

Total Export Containers for Port of Baltimore Total Market Area

	Tonnage	Percent	Port of Baltimore Tonnage	Port of Baltimore Percent
Local	1,051,825	48.9%	406,486	58.8%
Hinterland	1,095,435	51.1%	284,650	41.2%
TOTAL	2,147.260		691,136	

Baltimore handles 32% of her total hinterland exports.

Note: Total Market means Midwest Hinterland plus local market area.

SOURCE: A Market Profile of the Port of Baltimore 1970 and 1976, James Hobson. See footnote . Tables III-A, III-K.

and 23 percent of its container imports. In a reverse of the Port's own biases which had a balanced import hinterland and a skewed export hinterland, the market area figures show just the opposite. The report data for the total area show that the hinterland had a considerable edge over the local traffic. Yet in the export market there was a balance which did not exist before at the port. As the competition increases for the hinterland markets, one can expect Baltimore to compete and become more influential in her local area. One point to be made is that the huge impact of New York on the Baltimore local area had only been overcome by 1976. Up until that point, New York was stronger in both local and hinterland markets in both import and export container traffic.

Basically this shows that Baltimore is unique in the North Atlantic market it serves. The rest of her hinterland does not place as much emphasis on the local container traffic for exports as Baltimore, and they weigh heavily on the hinterland shipments of imports. However, while Baltimore may seem unique in her hinterland markets, the Port of New York has found similar experiences in her market and the below excerpt gives some explanations.

> The geographic area served by the port is subject to different degrees of competition from other ports. It appears that, with the exceptions of certain bulk commodities such as grain a significant proportion of the international commerce moving through a port is local or decidedly regional in terms of origin and destination. For example, the 1970 special census of domestic origin and destination of general cargo exports and imports indicated that for New York, the

> largest port in North America in terms of the volume of general commodity exports and imports, 58 percent of the volume of exports and 68 percent of the imports originated or terminated in the states of New York and New Jersey. Additionally, 39 percent of the exports and 58 percent of the imports originated or terminated, respectively, within 25 miles of the port.
>
> These figures indicate that while the New York-New Jersey Port is an ocean gateway for high and low-value import cargoes, the low-value commodities tend to be delivered to areas close to the Port, where transportation is relatively cheap, while the higher-value commodities move both locally and to distant destinations.[15]

In Tables 15 and 16, we see the commodities most often shipped via containers and the overseas destination and/or origins. Baltimore's proximity to manufacturing centers is borne out by the large number of manufactured products or products used in industrial manufacturing. Strangely enough, Baltimore imports many of the same commodities it exports. Eight out of the ten commodities are exported in the container trade. A general pattern of importing basic manufactured or complete products and exporting components and products necessary for manufacturing seems to emerge from the tables.

The second part of the table shows Europe and Central America as the leading container export markets. Europe and Japan are the leading importers of material to the Port of Baltimore by a large margin (79%). By 1980, Japan (E. Asian market) had overtaken the European container market (tonnage) to the U.S. as a whole with the West Coast making stronger gains than the East Coast.

TABLE 15

Principal Commodity Movements Through
the Port of Baltimore - 1976

(Ranked by Cargo Volume in Thousands of Tons)

General Containerized Cargoes

Commodity	1976 Exports Via Baltimore (000)	% of Total Baltimore Exports
Beverages	114.5	14.5
Machinery, other than Electric	108.0	13.7
Nonmetallic Mineral Mftrs.	68.1	8.6
Iron and Steel	66.5	8.4
Manufactures of Metal	39.7	5.0
Synthetic Resins, Cellulose, Plastics	39.0	4.9
Electric Mach., Apparatus & Appliances	33.7	4.3
Chemical Products & Materials	32.8	4.2
Textile, Yarn, Fabrics, Etc.	22.2	2.8
Fruits & Vegetables	21.7	2.7

Commodity	1976 Imports Via Baltimore (000)	% of Total Baltimore Imports
Fruits & Vegetables	130.4	21.0
Machinery, other than Electric	100.7	16.2
Transport Equipment	64.0	10.3
Beverages	59.9	9.6
Manufactures of Metal	51.5	8.3
Iron and Steel	51.3	8.3
Rubber Manufactures	27.5	4.4
Nonmetallic Mineral Manufactures	19.9	3.2
Chemical Elements & Compounds	13.7	2.2
Furniture	12.7	2.0

Source: Maryland Statewide Goods Movement Study. Simat et al., April, 1980.

TABLE 16

Principal World Areas of Origin or Destination of Movements
Through the Port of Baltimore - 1976

(Ranked by Cargo Volume in Thousands of Tons)

General Containerized Cargoes

Area	1976 Exports Via Baltimore (000)	% of Total Baltimore Exports
C. America	340.5	43.1
N. Europe	148.8	18.9
S. Europe/Med	79.1	10.0
E. Asia	62.9	8.0
S. America	52.8	6.7

Area	1976 Imports Via Baltimore (000)	% of Total Baltimore Imports
N. Europe	237.9	38.3
E. Asia	157.1	25.3
S. Europe/Med	92.9	15.8
C. America	43.1	6.9
S. America	39.3	6.3

Source: Maryland Statewide Goods Movement Study.
Simat et al., April, 1980

As mentioned earlier in this discussion, the competition for the Midwest (MW) hinterland is growing sharper every year. In Table 17, we see effects of this competition on the traditional Baltimore hinterland. In the table, we see that the exports of the traditional hinterland states are more "loyal" to the region than the imports, and that the local markets show higher "loyalty" than the MW markets. On the whole, the port region manages to control roughly 40 to 60 percent of both imports and exports of its hinterland states. New York, although losing some traffic to Baltimore every year, is still the major competitor in the North Atlantic range. The biggest competing port region for Baltimore is the Gulf and West Coast ranges. Los Angeles and Seattle are the primary competing ports with Seattle monopolizing the West Coast import container market for Baltimore's hinterland. At this time, there are still no well founded facts that show exactly what effect the West Coast has had on the Port of Baltimore. In the Conasa minibridge case one of the primary failings of the ports was the inability to document their losses to the West Coast. Fortunately for Baltimore, what evidence there was showed only a minor impact.

Returning to the import/export Tables 12 and 13, we see a general loyalty to Baltimore relying on distance from it and the availability of an in state port. Virginia for instance has Norfolk and hence imports only 12 percent of her containers through Baltimore. Delaware uses Baltimore heavily, accepting 42 percent of her container cargo imports

TABLE 17

Share of State Cargoes Moving Via Coastal Port Regions
Other Than The North Atlantic

1976

State	Share Moving Via Other Port Regions		Principal Competing Port Region		Principal Competing Port	
	Container		Container		Container	
	EX	IM	EX	IM	EX	IM
Illinois	27%	47%	GULF	WEST	NOR	SEA
Indiana	26	27	WEST	WEST	SFO	LAX
Kentucky	36	41	GULF	SATL	TPA	CHA
Michigan	4	17	WEST	WEST	SFO	SEA
Ohio	11	21	WEST	WEST	LAX	SEA
W. Virginia	8	27	WEST	WEST	SFO	SEA
Wisconsin	16	30	WEST	WEST	SEA	SEA
Maryland	1	10	WEST	WEST	SFO	SEA
Pennsylvania	9	9	WEST	WEST	LAX	SEA
Virginia	2	26	----	WEST	---	SEA
Delaware	--	14	----	WEST	---	SEA
Dist. of Columbia	--	--	----	----	---	---

Port Regions comprised of: S. Atlantic (SATL) = Charlestown (CHA), SAVANNAH (SAV)
GULF = Tampa (TPA), New Orleans (NOR), Houston (HOU)
West Coast (WEST) = Los Angeles (LAX), San Francisco (SFO), Portland (PDX), Seattle (SEA)

through the port. Michigan, being furthest away, uses the port for 11 percent of the imports while West Virginia uses Baltimore for 73 percent. Exports follow a similar but not as an exaggerated pattern.

Hopefully in this first section, the reader can see that containers are an increasing part of Baltimore's attempt to create a balanced cargo pattern of bulk versus general cargo. The idea that Baltimore's traditional hinterland area is changing is a very important point. Other ports are using frequency of carrier visits, lower harbor costs, and better location to Western markets to lure some of these traditional markets away. But there is another factor that is creeping into this changing hinterland picture. This is the pattern of railroads leaving the port area, either due to disinterest in the container trade or due to competition from the unregulated trucking industry. The port cannot continue to allow the railroads to depart from the port infrastructure if the port is to remain healthy. In this next section, we will examine this problem and how pervasive it is becoming.

IV. TRUCK v. RAIL IN CONTAINER MOVEMENTS

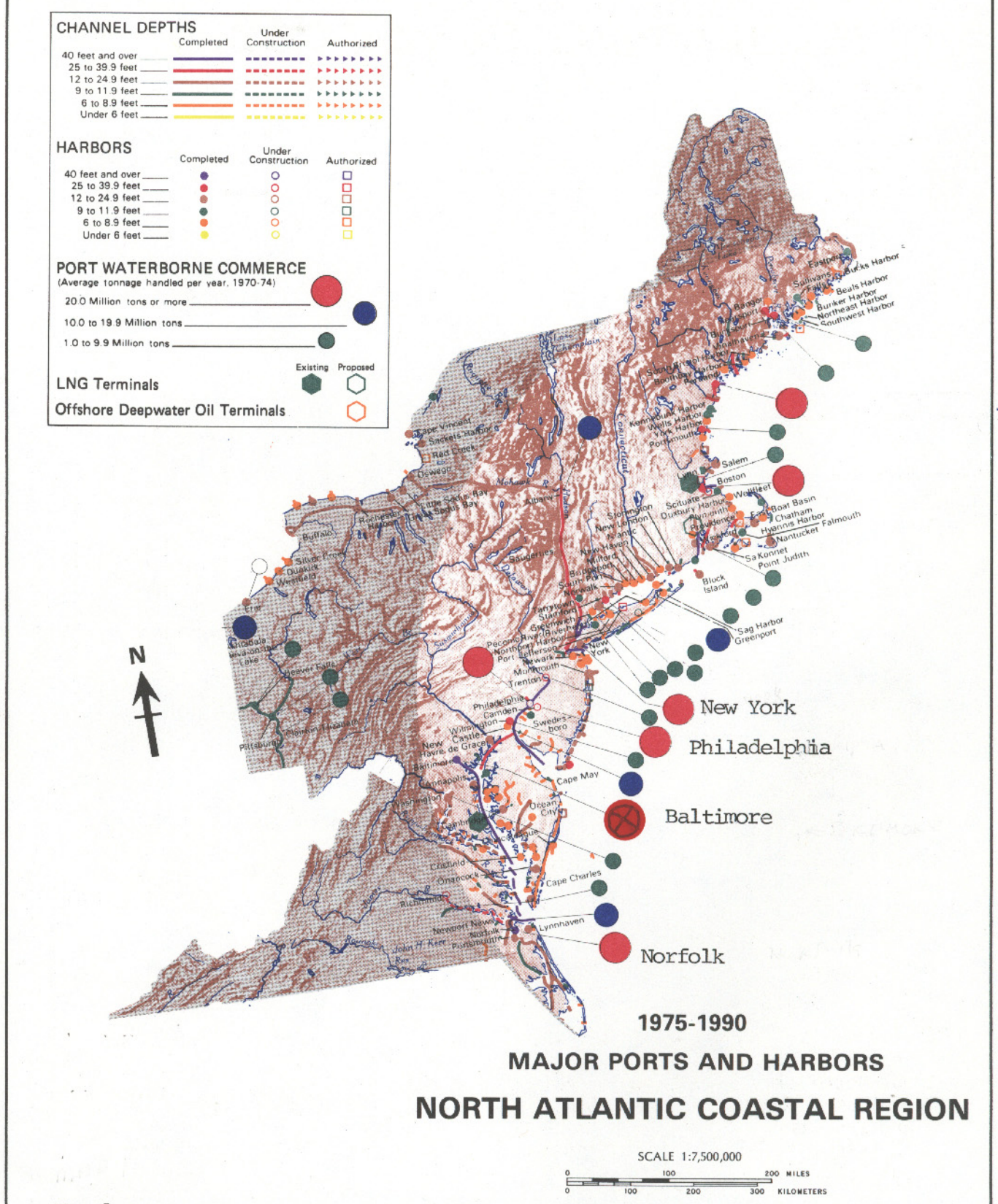
The problem of truck versus rail transportation can be quickly brought to focus by looking at three performance tables from the Maryland Port Administration at Dundalk Marine Terminal (DMT). Table 18 shows the 1976 through 1980 container movements via truck and rail. In 1980, the truck sector carried 82 percent of all DMT's containers. In the preceding years, this total remained around 70 percent. The percent in Illinois has dropped from 92 to 57 for rail in just three years and this is for a state roughly 800 miles from Baltimore. Traditionally, the rail's effectiveness has been strongest after 300-400 miles but the figures in the above table show that even in states such as Minnesota and Missouri, the trucking industry has equalized or beaten any rail advantages. The distance factor will be discussed later in this section.

A second table, to examine this loss of rail strength, is the TOFC/COFC operations in Table 19. Beginning in 1974, the total export/import total for Trailer on Flat Car/Container on Flat Car (TOFC/COFC) was 35,087 movements. Since 1974, there has been a steady decline to 12,022 movements in 1980. This is a decline of 65 percent in only six years. One has only to place the figures for total container movements in Dundalk underneath the totals for TOFC/COFC and one sees an equally sharp ascent. TOFC/COFC movements are

Table 18 (Continued)

State	Mode	1976		1977		1978		1979		1980	
Michigan	Rail	1,930	85%	2,012	83%	4,064	82%	2,678	66%	1,607	43%
	Truck	334	15%	416	17%	904	18%	1,381	34%	2,178	57%
	TOTAL	2,264		2,428		4,968		4,059		3,785	
Minnesota	Rail	23	34%	27	60%	115	88%	437	91%	113	52%
	Truck	44	66%	18	40%	15	12%	42	9%	106	48%
	TOTAL	67		45		130		479		219	
Nebraska	Rail	178	86%	219	70%	121	64%	355	75%	174	49%
	Truck	30	14%	93	30%	67	36%	121	25%	183	51%
	TOTAL	208		312		188		476		357	
Ohio	Rail	4,758	69%	4,373	64%	7,145	65%	6,897	60%	3,137	32%
	Truck	2,092	31%	2,417	36%	3,817	35%	4,626	40%	6,652	68%
	TOTAL	6,850		6,790		10,962		11,523		9,789	
Pennsylvania	Rail	123	1%	131	1%	271	2%	256	2%	304	2%
	Truck	11,917	99%	12,245	99%	15,474	98%	16,124	98%	15,051	98%
	TOTAL	12,040		12,376		15,746		16,380		15,355	
Tennessee	Rail	44	64%	24	24%	98	54%	216	71%	81	47%
	Truck	25		78		84		88		93	
	TOTAL	69		102		182		304		174	
Virginia	Rail	66	3%	23	1%	56	1%	26	1%	44	1%
	Truck	2,161	97%	2,409	99%	3,716	99%	4,038	99%	5,084	99%
	TOTAL	2,227		2,432		3,772		4,064		5,128	

Source: Dundalk Marine Terminal.



MAP 1

Source: National Port Assessment -MarAd, 1980/1990

Table 18

North Atlantic Region
Trade Growth Summary (000's L/T)

Commodity Class	1975	1980	1985	1990
IMPORTS				
General Cargo	10,671	15,119	17,440	20,947
Grains	7	6	5	4
Coal	1,187	2,297	4,182	5,044
Ore	27,196	24,117	28,404	34,144
Other Dry Bulk	9,999	15,460	19,378	23,286
Crude Petroleum	59,478	126,762	139,054	167,137
Petroleum Products	45,298	92,279	91,202	109,633
Liquefied Gases	629	1,581	2,523	3,034
Other Liquid Bulk	626	1,446	1,950	2,339
Sub Total	155,091	279,067	304,138	365,658
EXPORTS				
General Cargo	7,570	12,097	15,372	19,193
Grains	9,272	8,311	9,647	12,054
Coal	39,985	41,736	48,956	61,151
Ore	120	161	213	264
Other Dry Bulk	5,297	6,368	8,043	10,050
Crude Petroleum	0	0	0	0
Petroleum Products	571	749	739	928
Liquefied Gases	7	3	3	6
Other Liquid Bulk	807	1,148	1,446	1,804
Sub Total	63,629	70,573	84,419	105,450
RECEIPTS-DOM. OCEANBORNE				
General Cargo	9,393	10,526	11,977	12,931
Grains	205	214	238	288
Coal	269	326	374	448
Ore	0	0	0	0
Other Dry Bulk	3,743	3,766	4,171	5,005
Crude Petroleum	4,383	14,999	15,673	15,443
Petroleum Products	74,013	60,551	65,138	68,466
Liquefied Gases	11	0	0	0
Other Liquid Bulk	3,574	4,033	4,389	5,495
Sub Total	94,591	94,415	101,960	108,076
SHIPMENTS-DOM. OCEANBORNE				
General Cargo	3,914	4,321	4,744	5,170
Grains	74	84	92	140
Coal	265	317	376	436
Ore	15	15	15	15
Other Dry Bulk	3,658	4,002	4,323	5,109
Crude Petroleum	431	220	187	159
Petroleum Products	35,021	34,781	38,259	40,172
Liquefied Gases	0	0	0	0
Other Liquid Bulk	577	689	831	1,197
Sub Total	43,955	44,429	48,827	52,398
TOTAL IMPORT/EXPORT	218,720	349,640	388,557	471,018
TOTAL RECEIPTS/SHIPMENTS	138,546	138,844	150,787	160,474
GRAND TOTAL	357,266	488,484	539,344	631,492

Table 18 (Continued)

State	Mode	1976		1977		1978		1979		1980	
Wisconsin	Rail	279	83%	213	60%	273	66%	306	65%	202	31%
	Truck	58	17%	144	40%	138	34%	166	35%	458	69%
	TOTAL	337		357		411		472		660	
West Virginia	Rail	536	31%	265	16%	524	25%	469	17%	310	11%
	Truck	1,168	69%	1,365	84%	1,577	75%	2,241	83%	2,443	89%
	TOTAL	1,704		1,630		2,101		2,710		2,753	
All Other States	Rail	1,563	38%	1,261	33%	1,704	30%	948	14%	763	9%
	Truck	2,573	62%	2,567	67%	3,922	70%	5,828	86%	7,613	91%
	TOTAL	4,136		3,828		5,626		6,776		8,376	
Total Rail		16,702	29%	15,774	27%	29,518	36%	27,044	31%	15,259	18%
Total Truck		40,276	71%	43,735	69%	52,724	64%	59,319	69%	69,234	82%
GRAND TOTAL		56,978		59,509		82,242		86,363		84,493	

Dundalk Marine Terminal.

TABLE 19
Dundalk Marine Terminal
TOFC/COFC Operations
End of Year Summaries - 1974 Thru 1980

Year 1974 - Export	
Penn Central	15,004
Chessie	4,495
TOTAL	19,499
Year 1974 - Import	
Penn Central	12,560
Chessie	3,028
TOTAL	15,588
Total Exp/Imp	35,087
*Total Containers	174,011

Year 1975 - Export	
Penn Central	16,289
Chessie	81
TOTAL	16,370
Year 1975 - Import	
Penn Central	10,912
Chessie	10
TOTAL	10,922
Total Exp/Imp	27,292
Total Containers	196,326

Year 1976 - Export	
Conrail	14,609
Chessie	40
TOTAL	14,649
Year 1976 - Import	
Conrail	8,487
Chessie	0
TOTAL	8,487
Total Exp/Imp	23,136
Total Containers	200,151

Year 1977 - Export	
Conrail	13,581
Chessie	0
TOTAL	13,581
Year 1977 - Import	
Conrail	7,594
Chessie	0
TOTAL	7,594
Total Exp/Imp	21,175
Total Containers	188,408

Year 1978 - Export	
Conrail	18,979
Year 1978 - Import	
Conrail	9,778
Total Exp/Imp	28,757
Total Containers	245,326

Year 1979 - Export	
Conrail	12,649
Year 1978 - Import	
Conrail	9,454
Total Exp/Imp	22,103
Total Containers	243,465

Year 1980 - Export	
Conrail	7,483
Year 1980 - Import	
Conrail	4,539
Total Exp/Imp	12,022
Total Containers	245,977

*Total for Port of Baltimore

Source: Dundalk Marine Terminal

entirely rail oriented, and their demise shows the drastic cut-back in rail services to the port. It is also interesting to note that the Chessie System has stopped servicing the DMT since 1976. If Conrail can be termed a North-South rail system, then Chessie might be termed an East-West route. "The Chessie System (Baltimore and Ohio Railroad and the Western Maryland Railway) has the most route miles within the state and provides direct service to the largest geographic area." What this basically means is that with no Chessie-DMT interaction the Port of Baltimore is slowly cutting itself off from many East-West container movements and markets. This also means that the Chessie System, which is now an enormous collection of other railroads and could provide extensive rail connections to the West and Southeast, is not participating at DMT. It should be mentioned that Chessie does service DMT but only via a barge or truck service. One final table (20) shows the potential for TOFC/COFC for the future of the Port of Baltimore. Noting the large estimated increases for TOFC for the East/West movements and noting the fact that Chessie is the main carrier for East/West TOFC containers, it is very strange that Chessie is not connecting with Baltimore's largest container pier directly. Another important note is that TOFC has the highest projected growth rate except for coal. It seems paradoxical that a dynamic growing port could allow the terminal that carries 60 percent of its container traffic to be served by only one carrier that is losing business at a rapid rate. Obviously, there are

problems and some of these will be discussed later. But as this section is about truck versus rail a few general principles are in order.

When cargo moves away from a port toward a hinterland two factors decide how it will travel: time, distance and the resultant cost. Some commodities must move quickly and therefore have a high intrinsic value. Fruit or electronic components all are worth nothing when not at their market and inventories are expensive. They will command higher rates because they have to move faster. Bulk items generally are not as time sensitive, and are usually handled more cheaply when carried in a large quantity. Containers make all items equal in size, shape, and handling characteristics. The carrier is the one who must move quickly to make his profit, especially now that the rates have recently been deregulated and become highly competitive. But returning to the shipper, the problem lies as to which mode is cheaper or which mode gives the best service, or transit time. Trucks by their very nature of being maneuverable and not restricted to tracks, have been collecting major portions of the container market because they are flexible and cheaper. However, there comes a point where the fuel involved in moving just that one container begins to weigh heavily. Railroads have traditionally been cheaper over longer routes due to scale economics. Trucks have usually captured the shorter distance markets. Usually this division is around 300 to 400 miles but will vary with the commodity and the preferences of the shipper. In Table 21, there are a series

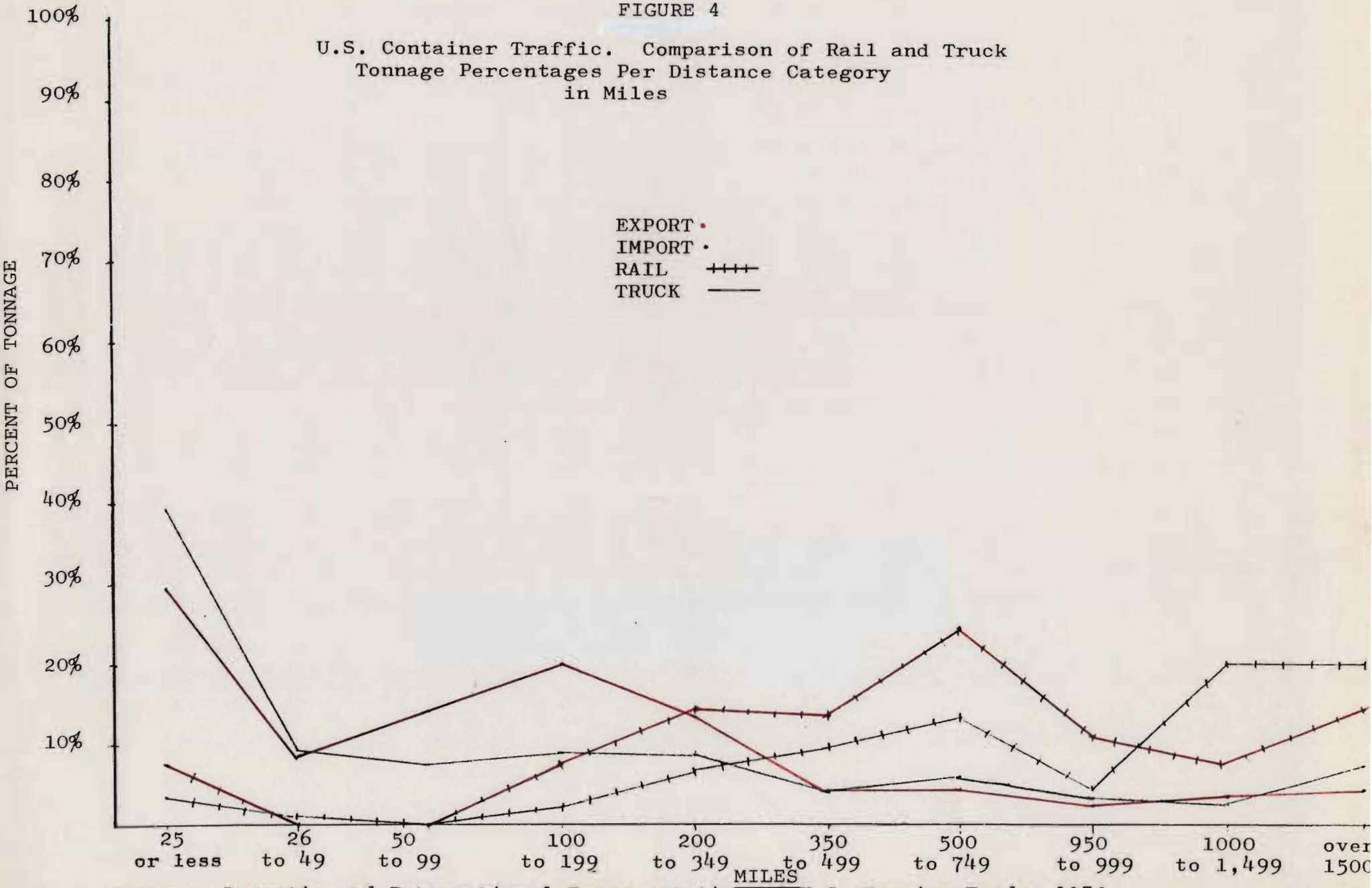
of break-even points calculated for different commodities. These break-even points are where the shipper will shift from truck to rail. From this table it can be seen generally (with some exceptions), bulk items prefer the railroad's savings in scale economies with distance. Fresh vegetables can not wait long in rail yards, hence they utilize trucking for longer distances even if the cost becomes more than the rails'.

As mentioned before, break bulk or bulk are either non-homogenous or require extensive loading and unloading methods. Containers do not. Other than the extremely high cost of an installation to handle the units, the operation is relatively simple and less labor intensive. Containers can also carry a variety of commodities so that a container of fruit may be on the same train as a container of rugs. In order to see if this affects the break-even point, a quick look at the following figures are in order. The first figure 4 shows the import/export truck-rail break-even point for containers in the U.S. as a whole. It becomes readily apparent that trucks are the clear winners up to the 200 to 349 mile category, at which point rail becomes more practical. Exports break even sooner than imports, but roughly in the same 100 miles. In both import and export, the rail attractiveness seems to peak in the 500 to 749 category. It stays ahead of truck costs from the break-even point on, with a few new peaks in rail in the 1000 to 1499 mile category. This merely points up rail's long distance cost effectiveness over trucks. Commodity does not make any difference.

FIGURE 4

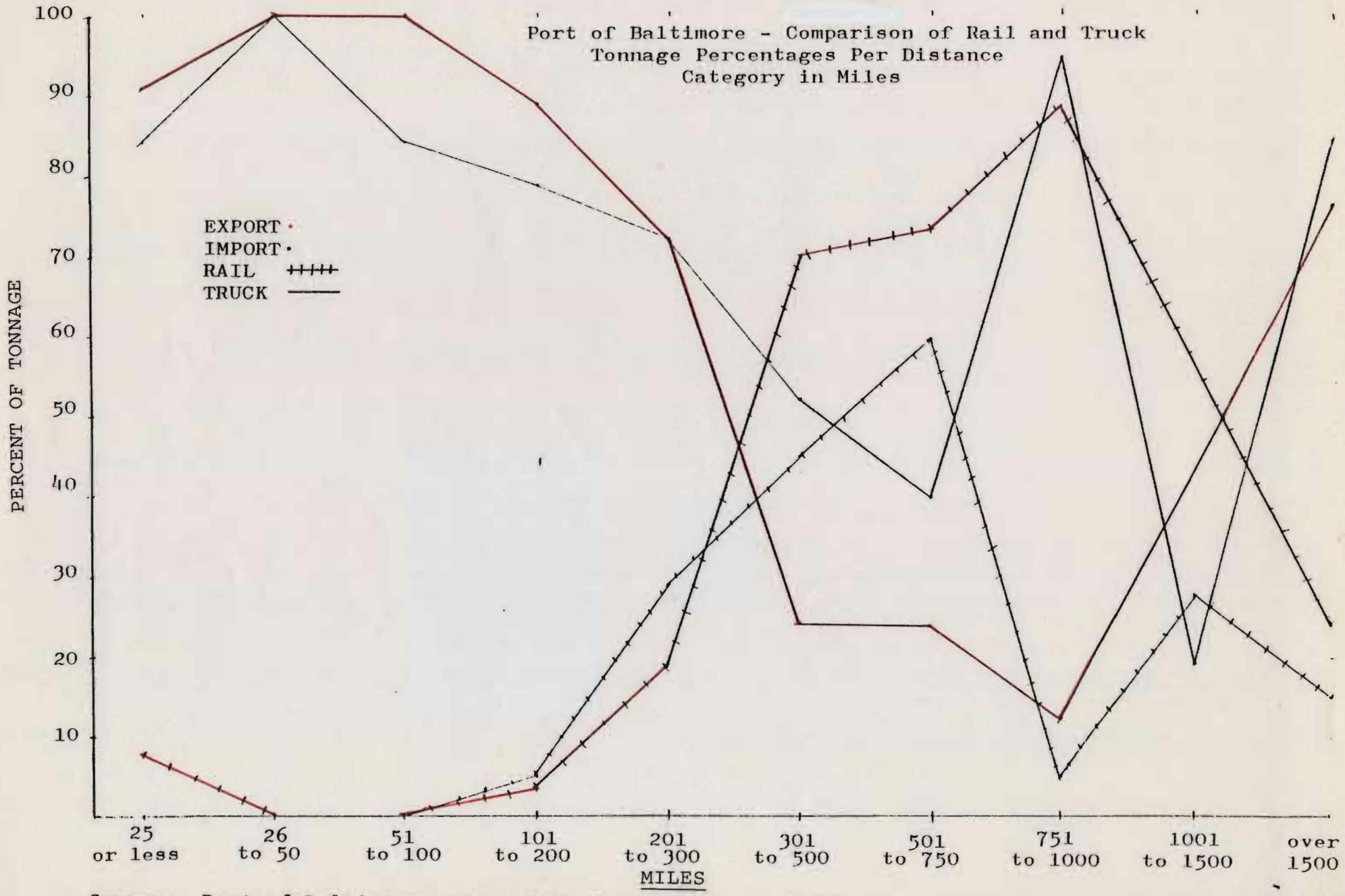
FIGURE 4

U.S. Container Traffic. Comparison of Rail and Truck Tonnage Percentages Per Distance Category in Miles



Source: Domestic and International Transportation of U.S. Foreign Trade: 1976.
Exports - Table 13. Imports - Table 10

FIGURE 5



Source: Port of Baltimore - Marketing Study; Hobson, 1980.

It is when we get to Baltimore's container traffic that the uniqueness of its transportation market becomes apparent. In Figure 5, we see the import and export rail-truck patterns from 25 to over 1500 miles. The truck preference stays higher longer in this market than in the U.S. graph. The break-even points for import and exports are approximately in the same mileage as the U.S. with exports before imports. The main difference being that the import break-even point is almost 200 miles later. In the Baltimore graph following the break-even point, the rail and truck begin a dramatic divergence in the export with the rail reaching its peak and the truck reaching its lowest point at the 750 to 1000 mile point. After 1500 miles, trucks become more attractive by a wide margin. With regard to imports, the difference between the U.S. averages and Baltimore's are equally astounding. The import-rail starts very slowly while the import-truck has the same high curve as the export-truck. Again, the break-even point occurs somewhere near the 300-500 mile point, and again it is from that point on that the numbers become absurd. Starting in the 501 to 750 mile category the trucks reach a peak that is just below their initial starting point in the low mileage area. At the 751 to 1000 mile point the trucks are handling 95 percent of the market whereas rail has only 5 percent. This is almost a complete reversal from exports. After a dip to just below rails at the 1000 to 1500 mile point, trucks again leave rails declining while they climb to a third peak in the over 1500 mile category.

Once more trucks beat rail at its own game, especially in the much longer distances. What makes this phenomenon all the more interesting is that at the 750 to 1000 range the market area for Baltimore is reaching its distance limits. What is more perplexing is the fact that the rail and truck export curves do not dip where the other rail and truck curves dip (i.e., the 751 to 1000 range) and that it is surpassed by the truck curve at this point. In imports, the truck curve is very close to the rail curve at this point after which trucks far outpace the rails. One can only speculate that these distances relate to the fact that Chicago and East St. Louis are two major container centers and that they fall within this mileage range. Chicago is 767 miles by rail from Baltimore and East St. Louis is 891 miles. As to why truck over rail, this author is without an answer.

If one looks for consolation to this problem by looking at the fact that in the two largest export (1976) container tonnages were in the categories where the rail percentages were highest (70%), it is a false hope. In 1980, the top five states for export container movements (DMT) were Maryland, Pennsylvania, "all other states," Ohio, and Illinois. Of these five categories, only Illinois had a rail percentage over 50 percent. After Ohio's 32 percent the other three had percents of 8, 2, and 9. The purpose of this paper is not to frighten anyone, but looking from a layman's point of view, the situation does not look healthy.

Perhaps one way to explain this truck over rail preference can be seen in Table 22 which shows why shippers in the Baltimore market area use certain modes. In section "C", one sees that rates are the prime reason for mode change. One also sees that the majority of users are going to truck rather than to rail.

> For rail users, quality of service influences modal choice decisions and has caused, and will continue to cause, changes in the amount of rail service demanded. Poor transit time, car supply, and service reliability appear to be among the most important complaints of Baltimore rail shippers.[16]

The other priorities for mode selection are equally important to some shippers as the Port of New York will show. Stolen goods, high stevedore rates, and poor reliability have hurt New York's standing as premier container port with the most sailings to the most foreign ports. In 1980, the rates for container rail shipments were deregulated in order to allow the railroads to compete with the trucking industry. It will be some time before the full impact of deregulation is felt in the North Atlantic ports and in Baltimore in particular.

Having now ascertained that there is a problem with the railroads in the port, it would be wise to describe some of these problems and how they relate to Baltimore. The next section will analyze rate and infrastructure problems in the Port of Baltimore to show how each one is potentially hurting Baltimore's utilization of container capabilities.

TABLE 22

Inland Mode Transportation
Preferences of Survey Respondents

Primary Mode Currently Used	Total	%	Exporter	Importer	Both
Motor Carrier	238	69.7	111	41	86
Rail	69	20.2	31	7	31
Inland Waterway	1	.3	0	0	1
Not Specified	33	9.7	14	4	15
	341				

Recent Changes in Inland Mode	Frequency	Percent
Rail to Motor Carrier	21	62%
Motor Carrier to Rail	12	35
Motor Carrier to Inland Mode	1	3
TOTAL	34	100%

Reasons for Changing Inland Mode	Frequency
Lower Costs/Rates	15
Reliability of Service	7
Improved Service	4
Lack of Rail Cars	3
Transit Time	3
Damage/Loss Experience	3
Bulk Shipment Handling	1
Not Specified	8

SOURCE: Maryland Statewide Goods Movement Study, Simat, Helliesen & Eichner, Inc., April 1980, pp. 3-20

V. RAILROAD PROBLEMS IN BALTIMORE AND THE PORT

When the Baltimore and Ohio (B&ORR) Railroad first came to Baltimore in 1827, it was with 13 miles of track from a small inland town called Mt. Clare. With that modest beginning, the B&O brought to life the fledgling port of Baltimore. Perhaps no other port better exemplifies the role of railroads in early commerce development than the City of Baltimore. Early American history is shadowed with the stories of railroads bringing new life to seemingly barren areas. The B&ORR was no exception.

> A major railroad networking having a single port outlet acts as a powerful solicitor for a port. Indeed, railway solicitation is often well organized, far-flung, and relatively more effective than official port promotion in attracting traffic through a port.[17]

Following an euphoric rise in development and two world wars the Port of Baltimore realized that the once strong railroads were no more and today the situation is still unresolved.

Baltimore is presently served by three railroads, the Chessie System, the Western Maryland RR, and Conrail. The Western Maryland line is basically a subsidiary of the Chessie System and for ease of presentation the Chessie System will be assumed to include the Western Maryland. The Canton railroad exists wholly within the City of Baltimore and basically

covers the northeast corner of the Port of Baltimore. It controls roughly 40 miles of track. A brief description of the two major companies and their impact on Maryland is helpful toward understanding the size of the problems involved.

The Chessie System is comprised of three operating railroads - the Baltimore & Ohio (B&O) acquired in 1962, the Chesapeake and Ohio (C&O) the parent company, and the Western Maryland RR acquired in 1967. Most of the Maryland based Chessie System is under daily management of the B&O. The Chessie System controls 563.3[18] miles of main and line track in Maryland. In the course of 24 hours, there are five trains leaving to the West from Baltimore that are "broken" and reclassified in Cumberland (see Figure 4), where they are joined to other B&O trains from Philadelphia. The Chessie System employs 7,556 employees (1976) with an annual payroll of $109,466,056 as well as paying state and local taxes in excess of $3,109,000.

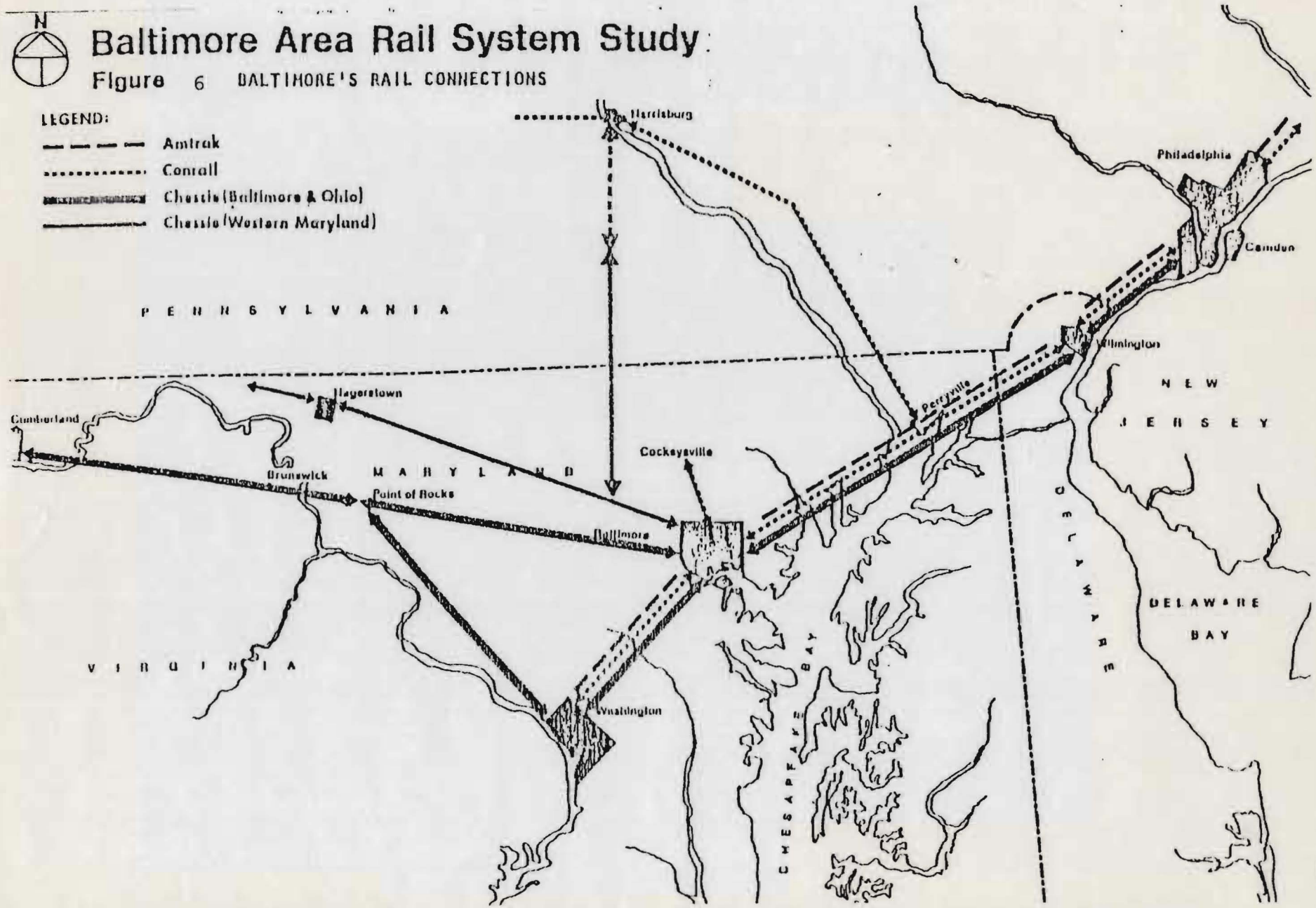
1. In 1977, Chessie handled over 24.2 million tons in Baltimore. Nearly 89 percent of this was local traffic, with the remaining 11 percent through traffic to or from Philadelphia.

2. Of the 21.4 million tons of local freight, 80 percent was inbound and only 20 percent outbound.

3. Nearly one half of the inbound traffic was coal. Mixed freight and grain were also major inbound commodities.

4. Mixed freight constituted over one half of the outbound traffic. To a lesser degree, ore was also significant in the outbound category.

FIGURE 6



Source: "Baltimore Area Rail System Study," Federal Railroad Administration, 1979

5. Coal, mostly for export, accounted for 39 percent of Chessie's local traffic. Mixed freight accounted for an additional 35 percent. Other commodities provided significantly smaller volumes: grain at 15 percent, ore at 8 percent, and TOFC at 3 percent.

6. Two-thirds of Chessie's traffic (mostly coal, grain, and ore) is directly related to the port.[19]

Conrail is a conglomeration of bankrupt railroads. The company issued shares that are almost entirely owned by the Federal Government. Of the track that Conrail inherited, the majority belonged to the Penn Central R.R. In Maryland, Conrail controls 207.8 miles of track and is the only railroad that can enter Dundalk terminal without paying a per car assessment. Conrail in 1976 employed 1,766 people whose wages and taxes amounted to 25.2 million. Both Conrail and Chessie claim to have attracted numerous industries to the state.

1. In 1977, Conrail handled 20.2 million tons in Baltimore. Approximately 13.2 million tons, or two-thirds of the total, were through traffic. Northbound through traffic was heavier than southbound traffic.

2. Of the 7 million tons of local freight, 4.6 million tons, or 66 percent, were inbound to Baltimore and 2.4 million tons, or 34 percent, were outbound.

3. The major inbound commodites were mixed freight and grain, followed by lesser amounts of coal and trailer- or container-on-flatcar (TOFC).

4. The major outbound commodities were mixed-freight, ore, and to a lesser degree, TOFC.

5. Mixed freight accounted for 41 percent of Conrail's local traffic. Grain accounted for another 23 percent. The remaining 37 percent was evenly divided among ore, TOFC, and coal.

MARYLAND STATE RAIL PLAN

BALTIMORE AREA RAIL LINES

Railroads

BO	Baltimore & Ohio RR
WM	Western Maryland RY
CR	Consolidated Rail Corp. (Conrail)
AMTK	National Railroad Passenger Corp. (Amtrak)
BLA	Baltimore & Annapolis RR
CTN	Canton RR
PBR	Patapsco & Back Rivers RR
( )	Trackage rights or subsidized operation

▲ Passenger Stations

■ Marine Terminals

1 Dundalk
2 Sea-Land
3 Canton Railroad
4 Rukert Terminals Corp.
5 North Locust Point
6 South Locust Point
7 Port Covington
8 Curtis Bay
9 Hawkins Point

Cartographic Services Lab
University of Maryland
College Park, Md. 20742

6. Approximately one half of Conrails' local traffic, including almost all grain, ore, and coal and a significant amount of TOFC, moves through the port.[21]

A brief look at the enclosed colored figure shows the individual marine terminals and the railroads that serve them. As one can tell from a cursory inspection, each railroad has its own "turf" and in the Port of Baltimore one of the major problems is moving individual cars from "your" terminal to "their" terminal or vice-versa.

> With the exception of New York, port development in the United States has been of one railroad, by one railroad, to serve one railroad. The waterfront, the railroad pier, and even the line of ships berthing at the pier have all come to be considered by the railroad as a part of its own private system.... When the rate structure solidified...the only competition left between the railroads was the competition at the terminals. The effect of this competition at the terminals for maritime freight has been to disrupt American ports into as many disconnected sections as there are railroad terminals at the port. The result has been disastrous to American port development.[22]

It is also very important when one considers large numbers of containers arriving at one time. This is one reason why truck rates were more attractive; the drayage charges were never assessed on any of their trips and the containers moved faster. The transfer of containers can be accomplished by three basic methods: direct rail transfer, truck transfer, and barge. Each one has its advantages and disadvantages. These are discussed below in an excerpt from a Department of Commerce report on the rail/port interface in Baltimore (1973).

> The switching charge for the shifting of a railcar onto or adjacent to a marine terminal for direct transfer is, at $25 per railcar, relatively attractive. However, the loss of immediate control and re-utilization of a railcar for at least several days is a disadvantage, especially in these days of frequent rail car shortages and rapid turn around time requirements for equipment.
>
> Drayage is a more flexible and expedient method of transfer. While drayage is more costly, it has the advantage of releasing the railcar and eliminating switching procedures required for direct transfer, frequently over a competitor's trackage.[23]

Baltimore has had its share of direct terminal transfer problems and most railroads prefer the barge and truck transfer to the loss of utility with other railroads' transfers. The rate making procedure is so tightly balanced on container movements that the loss of time and equipment to a competitor's system of switching makes truck and barge transfer inevitable. When one adds $25 for each container, the total cost of a container train is unacceptable. In a House of Representatives' hearing on railroads, Mr. Lichty, the General Manager of Operations for Chessie, summed up the feelings of the railroad towards moving over other rights of way:

> When you operate on trackage rights of another carrier, the financial terms under which you enter into that kind of arrangement are critical and you are at the other carrier's mercy from a service standpoint because you are operating on his property under his direction.[24]

This problem of interchange between railroads is a problem that is growing worse with the increasing volumes of traffic. This interchange not only delays movements of cars but adds

large costs to train movements. The following analysis came from a Department of Transportation study of the car interchange problem.

> The major conclusion of the car cycle analysis is that many cars spend a large portion of their total transit time in the Baltimore terminal area. The analysis shows that a majority of the cars analyzed take more than a day to move from road train to shipper/customer loading dock. (Canton interchange traffic was excluded.) Other conclusions of the analysis are:
>
> 1. Overall handling time for inbound cars appears to be generally slower than for outbound cars.
>
> 2. Baltimore appears to be a net consumer of inbound loaded cars, rather than a predominant generator of outbound loads.[25]

From the above scenario, one can easily see the basis for long delays in rail TOFC/COFC movements. It is no wonder that the Chessie System does not interchange TOFC with Dundalk. In fact, there have been more than a few suggestions to ease the situation. One idea is to get the TOFC/COFC cars out of Baltimore as quickly as possible to exterior yards where the sorting and train building can occur. An example of this is the Cumberland terminal for Chessie to the west of Baltimore. This answers the criticism raised in the Baltimore Area Rail System Study which gives the following assessment of Baltimore's local freight facilities.

> Analysis of freight yards in Baltimore indicates that, in general they have a more detrimental effect on the quality of local rail service than do the main lines. Conrail in particular, has a number of serious facility problems (inherited from its predecessors) that result in extra handling and lost time in moving cars

> to and from shippers. If projected growth in Conrail's traffic materializes, these problems will worsen. Chessie's yards work well, although facility problems exist in all of them.[26]

Baltimore's railroads were built between the end of the Civil War and the beginning of the First World War. Many of the local infrastructures were designed for shorter trains, and smaller cars. Most of the major terminals have large problems with long trains arriving and blocking their switching facilities or the tracks have so many bends that visual signals must be passed by extra crews at added expense.

> Among Chessie's facility-related problems is that the length of tracks in many yards is inadequate to switch, classify, and store the present and future volume of cars. The increasing number of 50-foot-long and longer cars, and the greater number of cars per train, has exacerbated the track-length problem, Grain and coal traffic are significantly affected.[27]

A prime example of old infrastructure is the B&P Tunnel on the Conrail (AMTRAK) lines.

The B&P Tunnel in Baltimore is 8,300 feet long with three tunnel sections separated by two open sections. The tunnel sections have curves in them that play significant roles in the tunnel's usefulness. When the tunnel was constructed in 1873, it was given an arched roof. In 1916, the floor of the tunnel was dropped 2-1/2 feet to allow larger cars to pass through. In 1959, a third track was laid in between the opposing tracks to allow even larger cars to pass through in the middle of the arched tunnel. Because present-day trains are so large, the use of the gantlet track prohibits traffic from

entering from the opposite direction. Add to this a southbound uphill grade which requires helper engines to assist heavy freight trains, and you have one colossal bottleneck for traffic. This becomes critical because many modern freight cars force the trains to use the center track of the tunnel. In order to avoid this, Conrail ran the larger cars at night when the opposing and passenger traffic ~~was~~ were not as heavy. Because the tunnel is used in the AMTRAK passenger scheme it cannot be used as much as Conrail would like,yet the increasing freight prospects for the Port of Baltimore hopefully will include Conrail.

> Bechtel analysis indicates that the 47 freights that are anticipated to use the tunnel in 1990 will each occupy the tunnel from 8 to 10 minutes. Gaps of this duration between passenger trains could be expected only 2 to 3 times per hour, and only when all passenger trains were on schedule, without allowance for maintenance or emergency situations. B&P Tunnel would be at or exceeding capacity with everyday operations, assuming that approximately two-thirds of daily freight moves during hours of passenger operation, as is the current situation.[28]

Something has to give. One solution to this is the idea of shorter faster trains that take up less of the tunnel's time and free it for more traffic. Perhaps a shift to heavier night time operations would also ease the congestion. Prospects of easing the situation by physical changes of the tunnel do not look promising at this point due to heavy financial commitments.

Old infrastructure in the Conrail system seems to be more pervasive than on the Chessie System. Conrail depends on local

yards to collect terminal traffic and send it out to the appropriate train or the reverse process for incoming inland traffic. The Bay View Yard is the most important Conrail yard and also the worst offender in efficient car handling.

> It lacks the capacity to receive, classify, store, and dispatch trains. This results in congestion on the AMTRAK main line when receiving tracks are full, and the need to maintain serving yards to supplement limited capacity, a condition that leads to double yarding of many freight cars, and significant loss of time. Problems in Bay View have a strong ripple effect throughout the entire yard system.[29]

In a study by the Federal Railroad Administration, the delay in the Conrail yards was shown to average, over a four-day period, between 4 hours and 1-1/2 hours per train. Fifty percent of this was due to congestion. It takes very little imagination to see that even in these reports, which were primarily prior to coal expansion, that the Port is struggling to handle the massive congestion of traffic that is coming through it. Many times the grain elevator operators have up to five grain unit trains arriving after a week of no trains at all. Clearly, this pattern cannot remain if coal is to become the pervasive and intensive cargo that is projected. If Baltimore is to expand its container market and balance the rail/truck imbalance, then the infrastructure must be improved.

> Current (TOFC/COFC) market penetration is limited by the high drayage fees required to move containers from shipside to the rail loading facility, the need for multiple train handling to move the containers from Dundalk over the circuitous routing to the departure point of TOFC/COFC line-haul trains, and the

> dispersed inland destinations of containers that limit the use of through trains to specific high volume destinations. Local drayage fees are also a problem for traffic moving from other port areas to rail-owned TOFC terminals.[30]

One suggestion for improvement, which again stresses the "satellite" yards outside the port area, is to allow through trains to come directly to the port already made up for the specific area intended. This is especially important with large customers such as Sparrows Point (Bethlehem Steel), Conrail coal trains to Curtis Bay (run by B&O RR) or ore to the docks at the Canton Pier. Some suggestions all have the trains being made up in specific centralized yards and being brought directly to the terminals involved. This would necessitate inter-rail agreements and cooperation. It would take port congestion out of the port and bring it to a yard better able to cope with the numbers involved. Again, the shorter faster trains are a more sensible way to handle the older infrastructure and increase utilization.

Some other points, to be noted in the hinterland/port interchange help put the need for a longer port market reach into perspective. While the rail industry has not kept pace with its sister transportation systems, the Northeast region has done even worse. One must realize that the Port cannot be content to rest its traffic on heavy local concentration when the area involved is declining in prosperity. Mr. John T. Ford of the Chessie System puts this perspective on the situation:

> In the Northeast, we are faced with a static growth. The Northeast is a stable, densely industrial area of the nation, but it has reached its full height. For the last 4 or 5 years, we have really strained to find new growth in Chessie's own service area. While reliable measures of industrial activity by region are hard to come by, all of our studies have suggested that growth rates in our territory will be half the national average, at best.[31]

It is not difficult to see that areas outside of the Northeast will be the targets for railroad and port development. National systems are now the predominant cargo carriers. Railroad mergers have placed long stretches of single control track into freight operations against equally strong trucking firms, who until recently had a monopoly on deregulated cargo. However, any rail system is only as strong as the terminals that serve it. If a container train for Chicago cannot leave Baltimore because of congestion or territorial disputes, the time advantage and Baltimore's distance advantage are lost. Landbridge, mini- and microbridge are all thriving intermodal systems that depend on fast transit to make the route competitive. By taking large numbers of freight cars to major sorting points, economies of scale are heightened. Baltimore cannot afford to lose any ground to other ports by neglecting these systems.

While Baltimore is doing well with the large export flow of coal, the burgeoning market for it has placed the Port at its limits. Samuel B. Nemirow, Assistant Secretary of Commerce, for Maritime Affairs, had this to say about East Coast coal ports.

> Rail and port loading facilities on the East Coast now are at or near capacity. They were designed to handle metallurgical coal stored in rail cars. Steam coal requires ground storage, which is not readily available, and little or no blending at the pier. Present facilities also make the operation of unit coal trains impractical. Resultant inefficiencies in unloading are costing at least $3 a ton and contribute to the high cost of overland rail transportation from mines to East Coast ports.[32]

While Chessie is expanding at Hagerstown and building a new yard at Brunswick, Md., what are the other railroads doing? Is Chessie doing enough? Will the actual port track system be ready when three major coaling piers are in full operation by 1985? While bulk is primarily a private enterprise, the congestion from it will be public. Hopefully, Baltimore is ready.

In this last section on the future of containers and TOFC, perhaps the dimensions of the market available can be seen. The theory of TOFC/COFC is to relieve the highways of congestion and use trucks for the more economical short haul terminal-shipper routes.

> In theory, rail TOFC/COFC services would combine the rail long haul advantages of fuel economy and possibly lower cost with the short haul efficiencies and flexibility of motor carriers, relieving the highways of the burden of long haul trucks.

While this may sound a bit simplistic, the potential is there. The East Coast railroads predict that if service were improved in TOFC/COFC, that they could claim 15 percent of the 4,000 trailers that traverse I-95 daily. This does not even touch

on the interstate systems that travel East to West. The Maryland Port Administration in its master plan (1973-1990) predicted that by 1980 there would be 2.76 million tons of container traffic through the Port. In actuality, the tonnage was 4.6 million, almost 2 million tons over the estimate. The market is obviously there. The Maryland State Rail Plan (1980) goes even further in its belief in intermodal TOFC/COFC potential; they also realize the limitations that the facilities in Baltimore place on it.

> Railroads are acknowledged to be more fuel efficient for long haul shipments than trucks, but they are limited in direct routing to many potential shippers who require fast door-to-door service. More railroads are realizing that intermodal shipping offers a sizable, but underexploited market where long haul rail and short haul truck movements are economically and mutually feasible.
>
> Within Maryland, especially the Port of Baltimore, intermodal facilities are limited, and service reliability has kept the railroads' share of container traffic low. Port traffic offers a large market for intermodal shipments which should grow as the energy efficiencies of rail are reflected in more competitive rates in the future.[34]

The railroads' potential and the drastic truck over rail cargo movement percentages have not gone unnoticed in other ports. In New York, the situation is similar to Baltimore's in their dependence on truck transportation. New York has only one railroad feeding the whole port system, yet 20 years ago had 8 to 10 railroads in service. Mr. Kenneth Schuman, executive director of the New York Office of Economic Development, noted:

> Unless the New York Port can extricate itself from the present above average use of trucks and provide the kind of rail service that will be required, the port economy will face a steady decline.[35]

The intermodal changes have left many ports unhappy, especially as these changes have generally left inefficient or longer distance ports out of the picture. On March 23, 1981 the ICC deregulated the TOFC/COFC 10 container rates. Before this time, the rates were the same between New York, Philadelphia, Baltimore and any inland area west of Pittsburg. A spokesman for the Port of Baltimore put the mileage assessment in perspective by showing that both Baltimore and Philadelphia are 140 miles closer to Chicago (e.g.) and should be given the benefit of the cost savings. He went on to say:

> . . . it's impossible for railroads to compete with motor carriers, if the railroads don't tie their prices to actual costs, such as miles.[35]

The above changes will continue to occur as long as competition is allowed to move cargo as cheaply as possible. Federal agencies must be careful to not overregulate industries that until recently have not competed on an equal basis.

> Several factors that could potentially improve rail's competitive position in the future include electrification of the track, reduced labor requirements, some form of relief from ownership of track right-of-way, and perhaps selected changes in some of the ICC (Interstate Commerce Commission) regulations imposed on the rail carriers. The potential for the future realization of these rail improvements isuncertain; however, some form of competitive relief is needed for the rail industry. Of the five major transportation modes (i.e., rail, truck, barge, airline, and pipeline), only rail transportation is not blessed by some form of federal support. Both truck and barge

> transportation have the advantage of federal funds being used to improve their routes. Air transport has been subsidized for many years, and pipeline transportation is helped by eminent domain legislation as well as less stringent ICC control. As a result, rail transportation must compete in a highly competitive market place, without some of the inherent advantages available to the other transportation modes.[37] (See Appendix B.)

Perhaps the most important aspect of this new potential is the State agencies who are helping to push this message to both the public and the private sectors of port development. In the Maryland State Rail Plan (1980), the Maryland Department of Transportation recognizes this need for guidance.

> In summary, Maryland's railroads are entering a period of change which will require management flexibility and investment--possibly at levels not seen in recent years. The State Rail Plan can act as an analysis tool, but the state government has only limited powers to change private sector investments of operations in the rail industry. By addressing these issues in the Plan, it is hoped that a public-private partnership can work together to provide the best, most cost-efficient rail system feasible.[38]

Baltimore and the Port must work to allow private rail and public facilities to interchange easily and quickly. If Baltimore is to grow at the projected rate and with the strength necessary to stabilize these gains, then the railroads must be there. This author hopes that Baltimore's past successes will allow her to handle the future in much the same way.

VI. SUMMARY AND CONCLUSION

Both the City and the Port of Baltimore are the direct result of railroad expansion in the late 1800s and early 1900s. Because of the proximity to the Midwestern agricultural and Eastern coal markets, Baltimore has traditionally been a bulk cargo created port. Beginning in the late 1960s, Baltimore entered the container revolution and expanded as rapidly as the revolution. By 1980, Baltimore handled 245,800 containers which was a growth factor of 261 percent from 1971. The growth has already surpassed the Maryland Port Administration's predictions for 1980 by two million tons. Unfortunately, there is an equally rapid descent in the percent of containers carried by rail as opposed to truck. Added to this is an equally sharp descent in Trailers on Flat Car (TOFC)/ Container on Flat Car (COFC) movements from the Dundalk Marine Terminal (DMT). The DMT handled over 60 percent of all containers in the Port of Baltimore in 1980 and supplies the most comprehensive container statistics available.

The figures and surveys available show the main reasons for the large trucking gains centering on two major ports. One is the rates for trucks are generally better for the smaller shipments of containers (one to three) that make up a large portion of the present container traffic. The second reason is perhaps even more important. Trucks are more

reliable and generally deliver the containers faster than the railroads. This accounts for the fact that after 1000 miles, the truck is the preferred carrier over rail. In Figure 4, it ~~is~~ was shown that for the U.S. as a whole rails were more economical and widely used after 400 miles. Something is wrong if Baltimore has truck traffic outlasting rail in its most economical form even after 1000 miles from the point of origin. It is the delay of cargo that makes rail so unattractive even beyond the economic break-even point.

Perhaps the major reasons for delay in rail traffic are congestion and lack of rail company cooperation. One cannot expect a customer to allow 24 to 48 hours extra for his container simply because Chessie cannot get his container from Dundalk terminal (Conrail) due to intercompany friction. Much of the congestion comes from old rail infrastructure made for smaller cars and shorter trains. This is best shown in the Bay View Yard and the B&P Tunnel. One solution (e.g., Cumberland) may be to utilize yards outside of the port for consolidation of unit trains destined for particular marine terminals. This would alleviate some of the congestion around the city and port while allowing for shorter trains due to more regular arrival of cargo from the consolidation point and the removal of the need for local switching operations.

Perhaps the most important point to be recognized in the changing port roles for cargo movements is the idea that ports are consolidation points for cargo that may be going beyond

its normal hinterland. This is best shown in the concept of landbridge and minibridge whereby cargo destined for the West Coast from Europe is shipped via train from New York rather than through the Panama Canal via ship. This saves roughly a week over the water route to the West. But if containers or even empty coal hoppers are delayed in leaving Baltimore, then the Port begins to become uneconomical as a gateway to export/import markets. Time is money and congestion costs time to both shippers and carriers. With the new international and cross country rail movements, Baltimore cannot allow old rail infrastructure to remove any options for cargo movements. It is foolish to believe that trucks can continue to compete with rail as fuel prices rise. With over 4,000 containers moving on I-95 each day it cannot be denied that there is a market for fast movements of containers either as TOFC or COFC.

Coal, while not a major concern of this paper, cannot be overlooked in its impact on the port's rail congestion. If the port has difficulty in returning empty hoppers to the coal fields, then delivery must also slow down, and hence ship departure times. If coal trains hold up container trains or vice versa, then everyone loses. While coal is primarily a "private" concern, the congestion it may cause is port-wide. There must be a cooperative effort if the "private" rail lines are to serve the "public" port.

If this author has presented a bleak picture, it is with optimism that it is shown. The ability to correct the situation

is available and past experience has shown that Baltimore can change with the needs of technology. The growth of containers is a good example. Without the railroads and the links for economic long distance transportation, Baltimore will have a difficult time enlarging its traditional hinterland. One has only to look at Boston to see a once strong port hobbled because of no rail connections. This author feels that the Port of Baltimore will prosper and will correct the problems at hand with rail movements. Hopefully this optimism is well founded.

APPENDIX A

Before discussing the various proposed rules, it is necessary to describe here the handling of this international traffic over a typical ocean-rail route, and also over a competing all-ocean route. Container traffic originating in Tokyo, Japan, frequently moves by ocean carrier to San Francisco or Los Angeles, Calif., where the containers are transferred to a rail carrier for transportation to such eastern seaports as Philadelphia, Pa. The joint line-haul rate for the ocean-rail service does not include the stuffing of the container at Tokyo nor the unstuffing of that container in Philadelphia, nor does it cover the picking up of the container at the ocean carrier's yard, stuffs the container at the shipper's dock, and returns the container to the ocean carrier's yard where that carrier then loads the container on board ship. A bill of lading is issued at Tokyo by the ocean carrier to the shipper. At San Francisco the ocean carrier unloads the container and delivers it to the railroad's piggyback ramp, where the railroad loads the container onto a flatcar for transportation to Philadelphia. At San Francisco the railroad frequently issues a bill of lading to the ocean carrier just as if the latter were a shipper. After the railroad unloads the container at Philadelphia, the consignee delivers the container to his own dock where the consignee unstuffs the container.

The above-described ocean-rail traffic competes with all-ocean service which moves from various far eastern points such as Tokyo via the Panama Canal to various eastern seaboard ports of which Philadelphia is typical.

Source: 346 ICC 690.

APPENDIX B

Total Federal Subsidies to Transportation
(Excluding Expenditures from User Chargers)
Fiscal Year 1979
(Dollars in Millions)

MODE	Right-of-way facilities construction, operations and maintenance
Motor carriers	$325.0
Inland waterways	291.0
Great Lakes - St. Lawrence Seaway	45.1
Ocean shipping	463.0
Aviation	488.0
Rail transportation	0.
Mass transit	250.0
Total	$1,862.5*

*In contrast, the rail industry spent $1.47 billion on maintenance of way in 1972 plus paid $1.2 billion for interest on debt on such facilities, a total cost of $2.67 billion.

(II) Federal and Private Expenditures for Right-of-Way Facilities for Ground and Domestic Water Freight Transportation 1972
(Dollars in Millions)

	Operating revenues	Expenditures	Property taxes paid to State or local government
Railroads Class 1	$13,400	$2,670	$185
Rail-Competitive Motorcarriers	27,590	1,600	None
Inland waterway operators	590	None	None
Great Lakes	205	None	None

Source: Materials Concerning the Effects of Government Regulation of Railroads and an Economic Profile of Railroads in the United States; House of Representatives, Subcommittee on Transportation and Commerce, 1975.

FOOTNOTES

1. Maryland Department of Transportation, Port of Baltimore Handbook, 1979-80.

2. Ibid., p. 7.

3. Maryland Dept. of Transportation, Dept. of Economic and Community Development, Port of Baltimore: Opportunities, Performances, Forecasts, Impact, L978, p. 51.

4. POB Handbook, 1979-80, p. 28.

5. MDOT, POB, Opportunities, etc., p. 63.

   MAP 1 - U.S. Department of Commerce, Maritime Administration for Port and International Development, National Port Assessment, June, 1980.

   MAP 2 - POB Handbook - p. 34.

6. POB Handbook, 1979-80, p. 11.

7. Whereas railroad initiative was responsible for the early development of cargo terminals, it was the industrial and commercial sectors which later filled much of the remaining port shoreline. Industrial activity takes place on more than 42 percent of the Port's perimeter; among the activities are the massive steel and shipbuilding complex at Sparrows Point, the shipbuilding and repair yards in Fairfield, the ship repair yards along Key Highway and adjoining Ft. McHenry, the chemical and fertilizer plants in Curtis Bay, Canton, and along the Northwest Branch of the Patapsco River, the sugar refinery on Locust Point, the petroleum storage facilities (originally refineries) in Fairfield and Canton, the gypsum plants in Canton and Marley Neck, and the numerous power generating stations which dot the harbor shoreline. From: Baltimore Metropolitan Coastal Area Study, Dept. of H.U.D. & OCZM, March, 1978, p. 56.

8. POB Handbook, p. 12.

9. Ibid., p. 14.

10. Frequency of service is a key consideration in selecting a port for container exports. The Ports of New York and Norfolk are perceived as having the advantage of excellent service frequency. Baltimore received relatively low ratings in the shipper survey for "frequency of service," "number of carriers serving the port," and "nonconference carriers." What the shippers are saying is that they want

the lower rates that increased carrier competition and nonconference carriers can generate, as well as the scheduling flexibility that accures with increased sailings on their trade routes. From: Maryland Statewide Goods Movement Study; Task 5: The Port. A Status Report Findings and Recommendations; Simat, Hemesen and Eichner, Inc., Washington, D.C.; April 1980, p. 4-10.

11. Maryland Port Administration, The Port, p. 4, 5.

12. Stanley J. Hille and Charles A. Taff; University of Maryland, Dept. of Transportation. The Economic Impact of the Port Of Baltimore on Maryland, April, 1975, p. XV, XVII.

13. Maryland Port Administration, Port Promotion News Release (80-23) Jan. 5, 1981.

14. M.DOT, POB Opportunities, 1978, p. 23.

15. Rail Service Planning Office (ICC), Rail Rate Equalization to and from Ports - Preliminary Report, July, 1978, p. 59.

16. Peat, Marwick, Mitchell & Co. for Dept. of Transportation, Study of the Rail System of the Baltimore Region - Final Report, Sept. 1976, p. III. 7.

17. Donald J. Patton, General Cargo Hinterlands of New York, Philadelphia, Baltimore, and New Orleans, University of Maryland, 1955, p. 442.

    MAP 3: Maryland Dept. of Transportation, Maryland State Rail Plan - 1980.

18. Henningson, Durham & Richardson, for Maryland Dept. of Transportation, Maryland Statewide Railroad Planning Study, Summary Report, p. 4.

19. Federal Railroad Administration, U.S. Dept. of Transportation, Baltimore Area Rail System Study - Draft Final, May 25, 1979, p. 1-10.

20. M.DOT Maryland Statewide Railroad Study, p. 25, 27.

21. U.S. Dept. of Transportation, Baltimore Area Study, p. 1-9.

22. Maritime Research Board (National Research Council, Port Development in the U.S., National Academy of Science, Washington, D.C., 1976, p. 19.

23. Maritime Administration, U.S. Dept. of Commerce; Report on Rail and Marine Interface at the Port of Baltimore, November 1973, p. 13.

24. Mr. Lichty, General Manager of Operations Planning for the Chessie System, Hearings on HR 11492; April 11, 12, 17, 1978, Serial No. 95-157, p. 135.

25. Peat et al., Study of Baltimore Region, 1976, p. IV. 14.

26. Federal Railroad Administration, Baltimore Area Rail System Study, BARSS, 1979, p. 2.

27. Ibid., p. 3-27.

28. Peat et al., Study of Baltimore Region, 1976, p. V. 4.

29. Federal Railroad Administration (FRA), BARSS, 1979, p. 3-22.

30. Peat et al., Study of Baltimore Region, 1976, p. XI. 33.

31. FRA, BARSS, 1979, p. 2-4.

32. U.S. Dept. of Commerce News (MA SP 80-80), Oct. 8-1980, "Remarks by Samuel B. Nemirow," p. 5.

33. Rail Service Planning Office; Evaluation of the U. S. Railway Association, Preliminary System Plan, April, 1975, p. 64.

34. M.DOT, Maryland State Rail Plan, 1980; p. VI-15.

35. Journal of Commerce Staff; "Rail Rate Equality Legislation Proposed by New York Port," March 10, 1980.

36. Lisa S. Howard, "Northeast Ports Dispute Impact of Lower Conrail Trailer Rates," Journal of Commerce, April 9, 1981.

37. Maritime Research Board, Critical Issues in Coal Transportation - Proceedings of Symposium, National Academy of Sciences, 1979, p. 132.

38. M.DOT, Maryland State Rail Plan - 1980, p. V.

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